

March | 2016

Flint Water Advisory Task Force

# FINAL REPORT

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Commissioned by the Office of Governor Rick Snyder  
State of Michigan

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March 21, 2016

Governor Rick Snyder  
Office of Governor  
P.O. Box 30013  
Lansing, Michigan 48909

Dear Governor Snyder:

We, the Flint Water Advisory Task Force (FWATF), offer in this report our findings and recommendations regarding the Flint water crisis. We have come to our conclusions largely through interviews of individuals involved and review of related documents now available in the public record. Our report includes 36 findings and 44 recommendations, offered to fulfill our charge of determining the causes of the Flint water crisis, identifying remedial measures for the Flint community, and safeguarding Michigan residents.

We hope that our report serves three fundamental purposes:

1. Clarify and simplify the narrative regarding the roles of the parties involved, and assign accountability clearly and unambiguously.
2. Highlight the causes for the failures of government that precipitated the crisis and suggest measures to prevent such failures in the future.
3. Prescribe recommendations to care for the Flint community and to use the lessons of Flint's experience to better safeguard Michigan residents.

We are encouraged by your focus and expressed commitment to address the Flint community's needs, and to learn from the failures that have transpired. This commitment is appropriate because, though it may be technically true that all levels of government failed, the state's responsibilities should not be deflected. The causes of the crisis lie primarily at the feet of the state by virtue of its agencies' failures and its appointed emergency managers' misjudgments.

Given the extensive investigative reporting on the Flint water crisis (from which we have benefited greatly), we have limited our explanatory narrative. Rather, our report builds on the ample public record and information yielded through over 60 interviews and discussions to prescribe recommendations that, we hope, will ultimately safeguard and benefit Michigan residents for years to come. We have approached our work with a solemn commitment to the charge you invested in us: to place Michigan residents' well-being first.

Respectfully,



Matthew M. Davis, MD, MAPP



Chris Kolb



Lawrence Reynolds, MD



Eric Rothstein, CPA



Ken Sikkema

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## Executive Summary

### *Summary Statement*

The Flint water crisis is a story of government failure, intransigence, unpreparedness, delay, inaction, and environmental injustice. The Michigan Department of Environmental Quality (MDEQ) failed in its fundamental responsibility to effectively enforce drinking water regulations. The Michigan Department of Health and Human Services (MDHHS) failed to adequately and promptly act to protect public health. Both agencies, but principally the MDEQ, stubbornly worked to discredit and dismiss others' attempts to bring the issues of unsafe water, lead contamination, and increased cases of Legionellosis (Legionnaires' disease) to light. With the City of Flint under emergency management, the Flint Water Department rushed unprepared into full-time operation of the Flint Water Treatment Plant, drawing water from a highly corrosive source without the use of corrosion control. Though MDEQ was delegated primacy (authority to enforce federal law), the United States Environmental Protection Agency (EPA) delayed enforcement of the Safe Drinking Water Act (SDWA) and Lead and Copper Rule (LCR), thereby prolonging the calamity. Neither the Governor nor the Governor's office took steps to reverse poor decisions by MDEQ and state-appointed emergency managers until October 2015, in spite of mounting problems and suggestions to do so by senior staff members in the Governor's office, in part because of continued reassurances from MDEQ that the water was safe. The significant consequences of these failures for Flint will be long-lasting. They have deeply affected Flint's public health, its economic future,<sup>1</sup> and residents' trust in government.

The Flint water crisis occurred when state-appointed emergency managers replaced local representative decision-making in Flint, removing the checks and balances and public accountability that come with public decision-making. Emergency managers made key decisions that contributed to the crisis, from the use of the Flint River to delays in reconnecting to DWSD once water quality problems were encountered. Given the demographics of Flint, the implications for environmental injustice cannot be ignored or dismissed.

The Flint water crisis is also a story, however, of something that *did* work: the critical role played by engaged Flint citizens, by individuals both inside and outside of government who had the expertise and willingness to question and challenge government leadership, and by members of a free press who used the tools that enable investigative journalism. Without their courage and persistence, this crisis likely never would have been brought to light and mitigation efforts never begun.

### *A Series of Government Failures*

Flint water customers were needlessly and tragically exposed to toxic levels of lead and other hazards through the mismanagement of their drinking water supply. The specific events that led to the water quality debacle, lead exposure, heightened *Legionella* susceptibility, and

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<sup>1</sup> Direct and indirect economic impacts of the Flint water crisis include, for example, financial consequences to individuals and homeowners; impacts on economic development opportunities and on the revenue base for public services; and the costs of exacerbated requirements for water infrastructure repair and rehabilitation as well as long-term public health and social services.

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infrastructure damage are a litany of questionable decisions and failures related to several issues and events, including, but not limited to:

- Decisions related to the use of the Flint River as an interim water supply source.
- Inadequate preparation (for example, staffing, training and plant upgrades) for the switch to full-time use of the Flint Water Treatment Plant using the Flint River as the primary water supply source.
- Inadequate and improper sampling of distribution system water quality, potentially in violation of the Safe Drinking Water Act.
- Intransigent disregard of compelling evidence of water quality problems and associated health effects.
- Callous and dismissive responses to citizens' expressed concerns.
- Persistent delays in coordinating appropriate responses to the resultant public health crises once irrefutable evidence of exposure and poisoning was presented.

We cannot begin to explain and learn from these events—our charge—without also highlighting that the framework for this decision-making was Michigan's Emergency Manager Law. This law replaces the decision-making authority of locally elected officials with that of a state-appointed emergency manager. While one must acknowledge that emergency management is a mechanism to address severe financial distress, it is important to emphasize that the role of the emergency manager in Flint places accountability for what happened with state government.

Our complete findings and recommendations are provided throughout this report and also are summarized at the close of this Executive Summary. They are formulated to offer specific measures to better safeguard public health, enhance critical water system infrastructure, improve governmental decision-making and regulatory oversight, and mitigate the many negative health and economic effects facing the people of Flint. We hope that our findings and recommendations serve as a guide and template for remediation and recovery in Flint, and for safeguarding the health and well-being of residents across our state.

### ***FWATF Membership, Charge and Scope of Review***

The FWATF—composed of five members with experience and backgrounds in public policy, public utilities, environmental protection, public health, and health care—was appointed by Governor Rick Snyder on October 21, 2015.<sup>2</sup> We were charged with conducting an independent review of the contamination of the Flint water supply: what happened, why it occurred, and what is needed to prevent a reoccurrence in Flint or elsewhere in the state. We assessed ongoing mitigation efforts to help assure that short and long-term public health issues and water management concerns will be properly addressed to safeguard the health and well-being of the Flint community. We have developed findings and offer recommendations on the following:

- Roles of Government Entities in the Flint Water Crisis
  - State of Michigan
    - Michigan Department of Environmental Quality (MDEQ)
    - Michigan Department of Health and Human Services (MDHHS)
    - Michigan Governor's Office
    - State-Appointed Emergency Managers

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<sup>2</sup> Paragraph summaries of the FWATF members' backgrounds and experience are provided as Appendix I.

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- City of Flint
  - Genesee County Health Department (GCHD)
  - United States Environmental Protection Agency and the Lead and Copper Rule
  - Issues Presented by the Flint Water Crisis
    - The Reality of Environmental Injustice
    - Perspectives from Flint
    - Flint Recovery
    - State-Wide Recommendations

Before completing this report, the Task Force issued three interim letters to Governor Snyder offering findings and recommendations requiring immediate response, as follows:<sup>3</sup>

1. The first letter, issued December 4, 2015, identified our concerns about coordination of response measures and the need for a framework to measure results and clearly delineate responsibilities for continuing actions to protect public health.
2. The second letter, issued December 29, 2015, addressed the critical and urgent need to establish responsibility and ensure accountability for what happened in Flint.
3. Our third letter, issued January 21, 2016, addressed the need for the state to engage the scientific experts who overcame state and federal agency intransigence to expose the lead poisoning, and similarly to engage trusted, scientific experts drawn from independent institutions to address the implications of the Legionellosis outbreak.

In conducting our interviews, we have had complete independence and largely<sup>4</sup> unfettered access to local, state and federal government personnel. Interview subjects were not compelled to participate in our review, and the FWATF held no subpoena or judicial enforcement powers. We are grateful to the parties involved for their forthright willingness to discuss the events that transpired and their perspectives.

We acknowledge that other reviews and investigations are taking place, some with tools that the FWATF did not have, such as the subpoena and judicial enforcement powers mentioned above. We appreciate and support these reviews because the magnitude of this tragedy warrants deep and detailed investigation. It is our hope that these or other reviews examine certain issues we had neither the time nor investigative tools to fully explore, and that fell outside our immediate scope given the accelerated timeframe for our information gathering and rendering of judgments. These issues include, but are not limited to:

- State approval and permitting of the Karegnondi Water Authority (KWA) in a region that had ample water supply and treatment capacity, yet faced economic distress sufficient to warrant emergency management in its two largest urban centers.
- The appropriate role of regulatory agencies and the water utility industry in addressing the dangers presented by widespread use of lead in public and private plumbing systems.

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<sup>3</sup> The FWATF's interim letters to Governor Snyder are provided as Appendix II.

<sup>4</sup> The FWATF was not successful in scheduling an interview with representatives of the firm Lockwood, Andrews, & Newnam (LAN) despite several requests. LAN requested that questions be submitted to them in writing, and the questions we submitted are included in Appendix IV. As of the time of publication, the FWATF has not received responses to these questions.

Historically, regulatory agencies and the water utility industry at large have been reluctant to address these dangers beyond use of corrosion control treatment.<sup>5</sup> Though the industry now endorses strengthening of the Lead and Copper Rule and ultimate replacement of lead service lines (LSLs),<sup>6</sup> the industry has not (with notable exceptions) been proactive in reducing risk through full LSL replacement programs and has highlighted utility customers' obligations to manage lead risks on private property. While the recommendations of the National Drinking Water Advisory Council (NDWAC) advance objectives of full LSL replacements, enhanced monitoring, and improved public education, concerns persist about accountability, oversight and enforcement.<sup>7, 8</sup>

- Protocols for environmental compliance enforcement when EPA has delegated primacy (authority to enforce federal law) to state agencies, yet retains ultimate responsibility for protection of public health and management of environmental risks.
- Budgets for public health activities at federal, state, and local levels to ensure that highly skilled personnel and adequate resources are available. The consequences of under-funding include insufficient and inefficient responses to public health concerns, which have been evident in the Flint water crisis.
- The need for greater clarity on local and state processes and procedures for declaring emergencies in response to man-made catastrophes (in contrast to natural disasters). The efforts of local, state, and federal emergency operations teams in Flint beginning in

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<sup>5</sup> Historically, water industry groups have maintained that removing lead from water and plumbing systems is not necessary and would involve significant difficulty and expense (see, for example, "Controlling Lead in Drinking Water," Water Research Foundation, 2015). Notably, when EPA's Lead and Copper Rule (LCR) was published in 1991, it required replacement of entire LSLs, and in 1994 the water industry sought in court to limit this requirement to only the publicly owned portions of service lines (40 F.3d 1266, AWWA vs. EPA, 1994). In response, EPA revised the LCR in 2000 to allow for partial service line replacement—a practice the CDC later maintained was associated with *increases* in blood lead levels ("Important Update: Lead-Based Water Lines," Howard Frumkin, MD; CDC, May 2010). The water industry historically has focused on controlling lead exposure risks through use of chemical corrosion control methods and has offered a number of related studies (as compiled in "Lead and Copper Corrosion: An Overview of WRF Research," Jonathan Cuppett, Water Research Foundation, updated January 2016). The American Water Works Association (AWWA) also has published communications guides on lead-in-water issues (see, for example, "Communicating About Lead Service Lines: A Guide for Water Systems Addressing Service Line Repair and Replacement," AWWA, 2014; and "Strategies to Obtain Customer Acceptance of Complete Lead Service Line Replacement," AWWA, 2005). Yet industry guidance has taken the position that managing lead-related risks associated with LSLs and plumbing fixtures on private property is largely the utility customers' responsibility. Many water utilities have not informed customers proactively (if at all) about the presence of LSLs. As a result, customers generally have limited awareness of the potential need to take action to protect themselves from lead in drinking water.

<sup>6</sup> See, for example, AWWA press release: "AWWA Board supports recommendation for complete removal of lead service lines," March 8, 2016.

<sup>7</sup> For example, there are concerns that the voluntary, customer-initiated sampling approach recommended by the NDWAC will substantially decrease public water systems' ability to track presence of lead over time, identify emerging public health threats, and inform LSL replacement programs. For more information on additional concerns, see, for example, "Strength of New EPA Lead Rule Depends on Accountability," by Brett Walton, Circle of Blue, February 10, 2016, [www.circleofblue.org/2016/world/strength-of-new-epa-lead-rule-depends-on-accountability/](http://www.circleofblue.org/2016/world/strength-of-new-epa-lead-rule-depends-on-accountability/).

<sup>8</sup> NDWAC and water utility industry representatives have highlighted concerns about the significant financial resources and time required to effect full LSL replacement, suggesting the need to support reasonable yet aggressive scheduling of LSL replacement through both enforcement measures (within the LCR) and resource commitments of local, state and federal entities.

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January 2016<sup>9</sup> have demonstrated that emergency operations can be deployed appropriately and with multi-level coordination. However, delays in Flint occurred due to reluctance to elevate concerns, confusion and disagreement among authorities about how and what levels of emergency status were appropriate, and extensive application requirements.

We also note and acknowledge that additional information will continue to be revealed as other investigations and reviews of the crisis are conducted. The narrative, findings and recommendations in this report are based on our interviews and the public record available through February 2016. We believe this information alone warrants urgent and thorough response and supports our recommendations.

We hope that our earlier letters and this report contribute to the collective understanding of what transpired, evoke thoughtful consideration of our recommendations, and—most importantly—further motivate sustained response and support for the Flint community and more earnest and effective protection of all Michigan residents.

### *Acknowledgements*

The FWATF would not have been able to complete its work without the support of many individuals and organizations that dedicated their time, resources and passion to facilitate our review. We are indebted to the Michigan State University's Center for Local Government Finance and Policy for their administrative support and insights, particularly with regard to Michigan's emergency manager laws; and to Chris DeWitt of DeWitt Communications for keeping the task force informed regarding media coverage. We have been aided by technical insights from individuals in the water utility and public health communities, too numerous to name individually here, who have educated us on a broad range of issues. Where we have accurately stated the technical attributes of specific issues, it reflects on their guidance. We are responsible for any technical inaccuracies or unintentional misstatements of fact.

Perhaps most notably, we are deeply indebted to the members of the Flint community and safe drinking water and public health advocates who ultimately entrusted us with profound expressions of their frustrations, concerns, perspectives and hopes for the future. We are especially thankful to Flint residents for giving voice to the searing personal costs that are too often muted in the discourses about public policy implications. We are acutely aware that as we are a task force commissioned by the State of Michigan, their forthrightness was a leap of faith given what happened in Flint. We hope that our report honors their trust, advances their hopes for the future, and helps ensure that Michigan communities are safer.

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<sup>9</sup> The FWATF recommended to the Governor's office that an emergency be declared as early as November 2015 and issued its first letter to the Governor on December 4, 2015 noting the acute need for more effective coordination of activities.

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## **Findings of the Task Force**

**Note:** Footnotes and text supporting these findings and recommendations are provided in the individual sections of the report. The footnotes and text provide substantive detail and important context for our findings and recommendations. Also please note that the findings and recommendations are independent lists; the findings do not correlate one-to-one to the recommendations.

### **Michigan Department of Environmental Quality (MDEQ):**

- F-1. MDEQ bears primary responsibility for the water contamination in Flint.
- F-2. MDEQ, specifically its Office of Drinking Water and Municipal Assistance (ODWMA), suffers from cultural shortcomings that prevent it from adequately serving and protecting the public health of Michigan residents.
- F-3. MDEQ misinterpreted the LCR and misapplied its requirements. As a result, lead-in-water levels were under-reported and many residents' exposure to high lead levels was prolonged for months.
- F-4. MDEQ waited months before accepting EPA's offer to engage its lead (Pb) experts to help address the Flint water situation and, at times, MDEQ staff were dismissive and unresponsive.
- F-5. MDEQ failed to move swiftly to investigate, either on its own or in tandem with MDHHS, the possibility that Flint River water was contributing to an unusually high number of Legionellosis cases in Flint.

### **Michigan Department of Health and Human Services (MDHHS):**

- F-6. MDHHS's lack of timely analysis and understanding of its own data on childhood blood lead levels, along with its reliance on MDEQ and reluctance to share state data with Dr. Mona Hanna-Attisha and Professor Marc Edwards, prolonged the Flint water crisis.
- F-7. MDHHS bears ultimate responsibility for leadership and coordination of timely follow-up efforts in Flint and across the state regarding childhood lead poisoning. While local entities (for example, healthcare professionals, GCHD, health insurance plans) are partners in efforts to protect children from lead poisoning, MDHHS has the lead role and failed to exercise its responsibility.
- F-8. The consequences of lead exposure for Flint residents are expected to be long-term and will necessitate sustained investments in education, public and mental health, juvenile justice, and nutrition needs over the next 10 to 20 years.
- F-9. Too few children in Michigan are screened for lead through routine blood tests as recommended for children ages 1 and 2. Statewide screening goals for children enrolled in Medicaid are met in very few instances at the county level or within Medicaid health plans. This lack of information leaves parents, healthcare professionals, and local and state public health authorities uninformed about the possibility of lead poisoning for thousands of Michigan children.
- F-10. Coordination between MDEQ and MDHHS was inadequate to properly address the public health issues related to water quality in Flint. Communication was infrequent, and when it did occur, the default position was to conclude that the health problems were not related

to the water supply switch – rather than to assume that the problems might be related to the switch.

- F-11. Communication and coordination among local and state public health staff and leadership regarding Legionellosis cases in 2014-2015 was inadequate to address the grave nature of this outbreak. The fact that these cases occurred *while* there were several simultaneous concerns about quality and safety of water in Flint should have caused public health staff and leadership at local and state levels to coordinate their actions to ensure a prompt and thorough investigation.

#### **Michigan Governor's Office:**

- F-12. Ultimate accountability for Michigan executive branch decisions rests with the Governor.
- F-13. The Governor's knowledge, and that of Governor's office staff, of various aspects of the Flint water crisis was compromised by the information—much of it wrong—provided by MDEQ and MDHHS.
- F-14. The Governor's office continued to rely on incorrect information provided by these departments despite mounting evidence from outside experts and months of citizens' complaints throughout the Flint water crisis, only changing course in early October 2015 when MDEQ and MDHHS finally acknowledged the extent of the problem of lead in the public water supply.
- F-15. The suggestion made by members of the Governor's executive staff in October 2014 to switch back to DWSD should have resulted, at a minimum, in a full and comprehensive review of the water situation in Flint, similar to that which accompanied the earlier decision to switch to KWA. It was disregarded, however, because of cost considerations and repeated assurances that the water was safe. The need to switch back to DWSD became even more apparent as water quality and safety issues continued and lead issues began to surface in 2015, notwithstanding reassurances by MDEQ.
- F-16. The Flint water crisis highlights the risks of over-reliance—in fact, almost *exclusive* reliance—on a few staff in one or two departments for information on which key decisions are based.
- F-17. Official state public statements and communications about the Flint water situation have at times been inappropriate and unacceptable.

#### **State-Appointed Emergency Managers:**

- F-18. Emergency managers, not locally elected officials, made the decision to switch to the Flint River as Flint's primary water supply source.
- F-19. Treasury officials, through the terms of the local emergency financial assistance loan executed by the Flint emergency manager on April 29, 2015, effectively precluded a return to DWSD water, as Flint citizens and local officials were demanding, without prior state approval.
- F-20. The role of the emergency managers in Flint (in combination with MDEQ's failures) places primary accountability for what happened with state government.

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- F-21. Emergency managers charged with financial reform often do not have, nor are they supported by, the necessary expertise to manage non-financial aspects of municipal government.
- F-22. Michigan's Emergency Manager Law and related practices can be improved to better ensure that protection of public health and safety is not compromised in the name of financial urgency.

**City of Flint:**

- F-23. Flint Public Works personnel were ill-prepared to assume responsibility for full-time operation of the Flint WTP and distribution system.
- F-24. The Flint Water Treatment Plant (WTP) and installed treatment technologies were not adequate to produce safe, clean drinking water at startup of full-time operations. Flint's lack of reinvestment in its water distribution system contributed to the drinking water crisis and ability to respond to water quality problems.
- F-25. Flint Public Works personnel failed to comply with LCR requirements, including the use of optimized corrosion control treatment and monitoring for lead. Flint personnel did not identify residences with LSLs, secure an adequate number of tap water samples from high-risk homes, or use prescribed sampling practices (for example, line and tap flushing methods and sample bottle sizes).
- F-26. Flint Public Works acted on inaccurate and improper guidance from MDEQ.
- F-27. Many communities similarly rely on MDEQ to provide technical assistance and guidance on how to meet regulatory requirements. In the case of Flint, MDEQ assistance was deeply flawed and lax, which led to myopic enforcement of regulations designed to protect public health.
- F-28. The emergency manager structure made it extremely difficult for Flint citizens to alter or check decision-making on preparations for use of Flint River water, or to receive responses to concerns about subsequent water quality issues.

**Genesee County Health Department (GCHD):**

- F-29. Communication, coordination and cooperation between GCHD, the City of Flint and MDHHS were inadequate to protect Flint residents from public health threats resulting from inadequately treated Flint River water.
- F-30. The rate of follow-up on children with elevated blood lead levels through January 2016 was unacceptable, illustrating a low level of coordination between GCHD and MDHHS and insufficient resources devoted to this task.
- F-31. Management of the Flint River-sourced water supply may have contributed to the outbreaks of Legionellosis in 2014 and 2015 in Genesee County. Although the definitive cause of the outbreaks is uncertain at the time of publication, GCHD and MDHHS did not notify the public of the outbreaks in a timely fashion in order to urge caution.

**United States Environmental Protection Agency (EPA):**

- F-32. EPA failed to properly exercise its authority prior to January 2016. EPA's conduct casts doubt on its willingness to aggressively pursue enforcement (in the absence of

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widespread public outrage). EPA could have exercised its powers under Section 1414 and Section 1431 of the SDWA or under the LCR, 40 CFR 141.82(i).

F-33. Despite the clear intent of the LCR, EPA has accepted differing compliance strategies that have served to mute its effectiveness in detection and mitigation of lead contamination risks. These strategies have been adopted at water systems and primacy agencies across the country. Though there may be some ambiguity in LCR rule, none of it relates to what MDEQ should have done in Flint. There was and remains no justification for MDEQ not requiring corrosion control treatment for the switch of water source to the Flint River.

F-34. EPA was hesitant and slow to insist on proper corrosion control measures in Flint. MDEQ misinformation notwithstanding, EPA's deference to MDEQ, the state primacy agency, delayed appropriate intervention and remedial measures.

F-35. EPA tolerated MDEQ's intransigence and issued, on November 3, 2015, a clarification memo on the LCR when no such clarification was needed.

**Issues Presented by the Flint Water Crisis:**

F-36. The Flint water crisis is a clear case of environmental injustice.

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## **Recommendations of the Task Force**

**Note:** Footnotes and text supporting these findings and recommendations are provided in the individual sections of the report. The footnotes and text provide substantive detail and important context for our findings and recommendations. Also please note that the findings and recommendations are independent lists; the findings do not correlate one-to-one to the recommendations.

### **Michigan Department of Environmental Quality (MDEQ):**

- R-1. Implement a proactive, comprehensive cultural change program within MDEQ, specifically its ODWMA, to refocus the department on its primary mission to protect human health and the environment. MDEQ should aspire to become a national leader through a proactive program designed to detect and address contaminants in public water supplies in a timely manner.
- R-2. Establish an apprenticeship/certification program for MDEQ ODWMA employees that requires direct, hands-on experience with public water system operations. MDEQ ODWMA employees responsible for water system regulation and SDWA enforcement should be, or have access to, certified operators and subject matter experts (including, for example, those at EPA).
- R-3. Strengthen SDWA enforcement, most notably for the LCR. The state has the ability to strengthen its own enforcement of the SDWA and not wait for action to occur at the federal level.
- R-4. Participate in the Flint Water Inter-Agency Coordinating Committee's (FWICC's) work team established to oversee conversion from DWSD-supplied to KWA-delivered water. MDEQ should draw from that work to revise its policies and procedures for approval of water treatment and distribution system operating regimens, particularly when source water changes are contemplated.
- R-5. Participate in EPA's ongoing review and revision of the LCR, conveying lessons learned from the Flint water crisis.

### **Michigan Department of Health and Human Services (MDHHS):**

- R-6. Establish policies and procedures at MDEQ and MDHHS to ensure input by health experts and scientists when permit decisions may have a direct impact on human health.
- R-7. Establish and maintain a Flint Toxic Exposure Registry to include all the children and adults residing in Flint from April 2014 to present.
- R-8. Re-establish the Michigan Childhood Lead Poisoning Prevention and Control Commission.
- R-9. Ensure that MDHHS is transparent and timely in reporting and analysis of aggregate data regarding children's blood lead levels. MDHHS data regarding lead levels shall be provided to individuals and organizations, based on their expertise, upon request and in cases when the interpretation of data by MDHHS is questioned.
- R-10. Establish a more aggressive approach to timely clinical and public health follow-up for all children known to have elevated blood lead levels, statewide. MDHHS should expand its local efforts and partnerships to accomplish this goal. Whenever possible, routine

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screening for lead and appropriate follow-up should occur in children's primary care medical homes.

- R-11. Strive to be a national leader in monitoring and responding to exposure of children to lead by converting the Childhood Lead Poisoning Prevention Program (CLPPP) from passive collection of test results into an active surveillance and outreach program.
- R-12. Improve screening rates for lead among young children through partnerships with county health departments, health insurers, hospitals, and healthcare professionals.
- R-13. As the state authority on public health, and as the organization that conducted the epidemiologic study of Legionellosis cases in Genesee County in 2014-15, take responsibility for coordinating with GCHD and CDC to protect Michigan residents from further outbreaks of Legionellosis.
- R-14. In cases of switches in drinking water supplies in the future, assume that outbreaks of Legionellosis cases may be related to changes in water source and communicate the potential risk to the public, rather than assuming and communicating the opposite.

#### **Michigan Governor's Office:**

- R-15. Expand information flow to the Governor so that information providing the foundation for key decisions comes from more than one trusted source—and is verified.
- R-16. Create a culture in state government that is not defensive about concerns and evidence that contradicts official positions, but rather is receptive and open-minded toward that information. View informed opinions—even if critical of state government—as an opportunity for re-assessing state positions, rather than as a threat.
- R-17. Ensure that communications from all state agencies are respectful, even in the face of criticism, and sensitive to the concerns of diverse populations.
- R-18. The Governor must assume the leadership of, and hold state departments accountable for, long-term implementation of the recommendations in this report, including but not limited to the need for cultural changes across multiple state agencies, the need for health mitigation and LSL replacement in Flint, and the need for a funding strategy to address replacement of LSLs statewide.
- R-19. Review budget requests for MDEQ to ensure adequate funding is provided to the ODWMA. EPA audit and interviews indicate that Michigan's drinking water program might have one of the lowest levels of financial support within EPA Region V while having one of the largest, if not the largest, number of community water systems to regulate.

#### **State-Appointed Emergency Managers:**

- R-20. Review Michigan's Emergency Manager Law (PA 436) and its implementation, and identify measures to compensate for the loss of the checks and balances that are provided by representative government.
- R-21. Consider alternatives to the current emergency manager approach—for example, a structured way to engage locally elected officials on key decisions; an Ombudsman function in state government to ensure that local concerns are a factor in decisions made by the emergency manager; and/or a means of appealing emergency manager decisions to another body.

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- R-22. Ensure proper support and expertise for emergency managers to effectively manage the many governmental functions of a city. Decisions on matters potentially affecting public health and safety, for example, should be informed by subject matter experts identified and/or provided by the state.

**City of Flint:**

- R-23. Establish and fund a team of subject matter experts in water system operations (treatment and distribution system management) to support and train water system personnel, guide safe system operation under current conditions, and prepare for successful conversion to KWA.
- R-24. Implement a programmatic approach to Flint WTP and distribution system operations, maintenance, asset management, water quality, capital improvements and public engagement (including risk communication) to ensure that the disparate ongoing efforts to address Flint water system infrastructure needs are coordinated, fully documented, and structured to sustain high-quality potable water service over the long term.
- R-25. Implement a robust public engagement and involvement program in conjunction with the anticipated conversion to KWA-delivered water and provide for regular reporting to the Flint Water Inter-Agency Coordinating Committee (FWICC).

**Genesee County Health Department (GCHD):**

- R-26. Improve follow-up on public health concerns between GCHD, MDHHS and the City of Flint now and in the future, to effect timely, comprehensive, and coordinated activity and ensure the best health outcomes for children and adults affected.
- R-27. Presume that the risk of *Legionella* may remain elevated in the Flint water distribution system and must take appropriate steps with public and private partners to monitor and mitigate that risk as concerns about water quality continue in the City of Flint.
- R-28. Coordinate with state officials (MDHHS) and with local healthcare professionals and healthcare institutions in Genesee County and the City of Flint to mitigate the risk of Legionellosis in 2016 and beyond.

**United States Environmental Protection Agency (EPA):**

- R-29. Exercise more vigor, and act more promptly, in addressing compliance violations that endanger public health.
- R-30. In collaboration with the NDWAC and other interested partners, clarify and strengthen the LCR through increased specificity and constraints, particularly requirements related to LCR sampling pools, sample draw protocols, and LSL replacements—and, more generally, strengthen enforcement protocols with agencies delegated primacy.
- R-31. Engage Michigan representatives in ongoing LCR revisions and development of enforcement protocols at EPA and MDEQ.

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## Issues Presented by the Flint Water Crisis

### Environmental Injustice:

- R-32. Issue an Executive Order mandating guidance and training on Environmental Justice across all state agencies in Michigan, highlighting the Flint water crisis as an example of environmental injustice. The state should reinvigorate and update implementation of an Environmental Justice Plan for the State of Michigan.

### Flint Recovery and Remediation:

- R-33. Sustainably fund the Flint Water Inter-Agency Coordinating Committee (FWICC) to provide adequate resources to engage supporting sub-committees for delivery of public health and water system services.
- R-34. Clarify and effectively communicate the roles, work and expected outcomes of the City of Flint, FWICC and Mission Flint.
- R-35. Through collaboration among MDHHS, GCHD, local healthcare professionals, and health insurance plans, ensure 100 percent clinical and environmental follow-up with Flint families whose children have been found to have elevated blood lead levels since April 2014, and work together to ensure that follow-up occurs in children's medical homes.
- R-36. Offer all children listed in the recommended Flint Toxic Exposure Registry timely access to age-appropriate screening and clinically indicated follow-up for developmental and behavioral concerns by licensed healthcare professionals, as well as access to early childhood education and nutrition services.
- R-37. Consider establishing a dedicated subsidiary fund in the Michigan Health Endowment Fund to facilitate funding of health-related services for Flint.
- R-38. Establish a comprehensive Flint public health program, coordinated with county and state-level public health initiatives, that can serve as a model for population health across the state. This program should provide assessment, interventions, and support not only regarding the health effects of water contamination but also more broadly regarding the health effects of chronic economic hardship and other social determinants of poor health.

### State-wide Recommendations:

- R-39. Conduct an investigative review of the development and approval of the Karegnondi Water Authority and of the City of Flint's commitments to KWA water purchases.
- R-40. Institute a school and daycare water quality testing program (which could serve as a model for the U.S.), administered collaboratively by MDEQ and MDHHS, that includes appropriate sampling and testing for lead contamination for all schools and childcare centers in the state and effective reporting of test results.
- R-41. Develop a model LSL replacement program and funding mechanisms for financing work on private property.
- R-42. Revise and enhance information distributed by public water systems on the implications of widespread use of lead in public and private plumbing.

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R-43. Use the occasion of the Flint water crisis to prompt local and state re-investment in critical water infrastructure, while providing mechanisms to advance affordability and universal access to water services.

R-44. Prioritize health matters across all state agencies with establishment of a new Cabinet-level post focused on public health.

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## Background<sup>10</sup>

### *Flint, Michigan*

The beleaguered history of Flint, Michigan over the last several decades is well known,<sup>11</sup> yet some facts are particularly important to provide context for our findings and recommendations.

The City of Flint has suffered dramatic declines in population. From a peak of more than 200,000 in 1960, Flint's population had fallen below 100,000 residents by 2014. Since 2000, Flint has lost over 20 percent of its population.<sup>12</sup> Of the remaining residents, approximately 57 percent are Black or African American.<sup>13</sup>

Poverty is endemic in Flint, with 41.6 percent of the population living below federal poverty thresholds—2.8 times the national poverty rate. The median value of owner-occupied housing is \$36,700, roughly one-fifth of the national average.<sup>14</sup> Crime plagues the community; for 2013, Flint's crime index was 811 as compared to a national average of 295.<sup>15</sup>

Even before the Flint water crisis, Genesee County (in which Flint is the largest population center) exhibited poor health statistics. In a 2015 study, the county ranked 81<sup>st</sup> out of 82 Michigan counties in health outcomes. It ranked 78<sup>th</sup> in length of life, 81<sup>st</sup> in quality of life, 77<sup>th</sup> in health behaviors, 78<sup>th</sup> in social and economics factors, and 75<sup>th</sup> in physical environment measures. Only the quality of clinical care, for which the county ranked 22<sup>nd</sup>, is not a cause of acute community concern.<sup>16</sup>

### *Water Crisis*

The Flint Water System was first organized in 1883 under private ownership, and the City purchased the water system in 1903. Before 1967, Flint treated Flint River water at its Water Treatment Plant (WTP). To ensure adequacy and reliability of water supplies, in 1967 Flint signed a long-term water supply contract with the Detroit Water and Sewerage Department (DWSD). From 1967 through 2014, the Flint WTP served as an emergency backup to DWSD-supplied water. As such, the Flint WTP was not operated on an ongoing day-to-day basis, but rather four times per year to maintain readiness as an emergency backup. The WTP was also upgraded periodically to keep it ready for use as an emergency backup.

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<sup>10</sup> The series of events and decisions that led to the Flint water crisis are (now) well documented, thanks to the tireless efforts of local activists and journalists. In addition, the public record has been supplemented by the release of e-mails and other documents by the Governor's office and key state agencies. We are indebted to this construction of a substantial public record. We believe that this public record, in combination with insights obtained through our interview process, provides more than ample basis for our findings and recommendations.

<sup>11</sup> For extensive information on Flint's economic decline and troubled circumstances, see the report and endnotes provided in "Long-Term Crisis and Systemic Failure: Taking the Fiscal Stress of America's Older Cities Seriously: Case Study, Flint Michigan," by Eric Scorsone, Ph.D. and Nicolette Bateson, Michigan State University Extension, September 2011.

<sup>12</sup> BiggestUSCities.com, [www.biggestuscities.com/city/flint-michigan](http://www.biggestuscities.com/city/flint-michigan)

<sup>13</sup> U.S. Census, Quickfacts for Flint, Michigan and the United States, [www.census.gov/quickfacts/table/PST045215/00](http://www.census.gov/quickfacts/table/PST045215/00)

<sup>14</sup> Ibid

<sup>15</sup> City-Data.com, [www.city-data.com/crime/crime-Flint-Michigan.html](http://www.city-data.com/crime/crime-Flint-Michigan.html)

<sup>16</sup> County Health Rankings, [www.countyhealthrankings.org/app/michigan/2015/rankings/genesee/county/outcomes/overall/snapshot](http://www.countyhealthrankings.org/app/michigan/2015/rankings/genesee/county/outcomes/overall/snapshot)

DWSD provided water to Flint under a 35-year contract signed on December 20, 1965. The initial contract term expired in 2000 and renewed each year unless it was terminated by either party. As one of DWSD's wholesale customers, Flint was subject to the terms and rate-setting practices applicable to all of DWSD's wholesale customer communities. During the final 10 years that Flint received contractual service from DWSD, the average annual increase in water charges to Flint was 6.2 percent. DWSD's water supply has been treated for corrosion control for over 20 years and is deemed optimized for corrosion control treatment.

On April 16, 2013, after a symbolic Flint City Council vote that accompanied the Flint emergency manager's decision, the City joined the Karegnondi Water Authority (KWA), which had been established to develop a raw water supply pipeline from Lake Huron. After being advised of the City of Flint's intent, DWSD notified the City of the termination of its then-current water supply contract terms, effective April 2014. DWSD and the City of Flint, both under emergency management, continued unsuccessfully to negotiate alternative water supply terms. Although the State of Michigan was in control of both cities at the time, efforts to arrive at an agreement between the parties during the final year of service to the City of Flint ultimately failed.

In April 2014, the City of Flint began treating Flint River water at the Flint WTP on a full-time basis and distributing the treated water to its customers. A critical element of that treatment—corrosion control, as required under EPA's Lead and Copper Rule (LCR)—was (incorrectly) determined by MDEQ not to be required immediately; instead, Flint could complete two 6-month monitoring periods and MDEQ would then determine whether corrosion control was necessary. Soon after the City began distributing treated water from the Flint WTP, Flint residents began to complain about its odor, taste and appearance. Numerous water quality problems and operational challenges resulted in water quality violations related to *E coli* contamination and disinfection by-products (total trihalomethanes or TTHMs). Ultimately, the corrosiveness of the drinking water leached lead from pipes and plumbing fixtures, and it may have increased the likelihood of water contamination with *Legionella*.<sup>17</sup>

### Summary Timeline of Key Events

In this economically disadvantaged and ethnically diverse Michigan community, a series of disastrous decisions and events occurred. Following are the events most critical to development of our findings and recommendations:<sup>18</sup>

1. 1967: City of Flint enters into long-term water supply contract with the Detroit Water and Sewerage Department (DWSD).
2. 1991: U.S. Environmental Protection Agency (EPA) issues the Lead and Copper Rule to ensure routine local testing of drinking water and assurance of safe levels of lead and copper.
3. January 23, 2013: Mike Prysby/MDEQ e-mails colleague Liane Shekter Smith and others about feasibility of Flint switching to the Flint River, highlighting water quality concerns.

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<sup>17</sup> Bouffard K. Hospital ties Legionellosis to Flint water. *Detroit News*, January 23, 2016, [www.detroitnews.com/story/news/politics/2016/01/22/legionnaires-bacteria-found-tests-mclaren-medical-centers-water/79183428/](http://www.detroitnews.com/story/news/politics/2016/01/22/legionnaires-bacteria-found-tests-mclaren-medical-centers-water/79183428/).

<sup>18</sup> Appendix V provides a further, more detailed timeline that attempts to synthesize numerous timelines developed by other sources, including local media and government agencies.

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4. March 26, 2013: Stephen Busch/MDEQ e-mails MDEQ Director Dan Wyant with Liane Shekter Smith and other MDEQ staff copied, with warnings about public health risks associated with Flint River water.
  5. March 28, 2013: State Treasurer Andy Dillon e-mails Governor Snyder notifying him of his approval of Flint joining Karegnondi Water Authority (KWA) and MDEQ concurrence.
  6. April 16, 2013: Flint Emergency Manager (EM) Ed Kurtz signs agreement with KWA and informs the State Treasurer that the City will join KWA (decision officially announced May 1, 2013).
  7. April 17, 2013: DWSD issues letter to Flint notifying termination of contract to provide water service. Negotiations continue to establish alternative contractual arrangements for DWSD service to Flint.
  8. June 26, 2013: Flint EM Ed Kurtz authorizes a sole-source contract with the firm of Lockwood, Andrews, & Newnam (LAN) for professional engineering services to place the Flint Water Treatment Plant (WTP) into operation using the Flint River as a primary drinking water source.
  9. March 26, 2014: Stephen Busch/MDEQ e-mails Liane Shekter Smith and Richard Benzie/MDEQ on clarifying what Flint will be required to do before beginning full-time Flint WTP operation.
  10. April 16-17, 2014: Michael Glasgow/Flint Utilities Department e-mails MDEQ, noting unpreparedness of Flint WTP and apparent political pressure to start distributing water.
  11. April 29, 2014: Flint EM Darnell Earley notifies Detroit EM that Flint has switched water supply sources to the Flint River. Genesee County Drain Commission remains as a non-contract customer of DWSD.
  12. July 1, 2014: Flint begins first 6-month monitoring period for lead and copper in drinking water.
  13. August 15, 2014: *E. coli* bacteria violation in water sampled from the Flint distribution system leads to local boil water advisory.
  14. September 10, 2014: MDEQ requests pre-emptive operational evaluation for disinfection byproducts called trihalomethanes (THMs).
  15. October 1, 2014: MDEQ submits briefing paper to Governor's office re: City of Flint drinking water situation (boil water notices). Genesee County Health Department (GCHD) expresses concern to Flint Public Works regarding increased incidence of cases of Legionellosis since April 2014, and the possible relationship to use of the Flint River as the water supply. MDHHS epidemiology staff expresses concern but there is no further state-level evaluation.
  16. October 13, 2014: General Motors (GM) announces that it will cease to use Flint WTP-sourced water for its Flint Engine Operations facility until the KWA connection is completed, due to corrosion concerns related to the chloride levels in water from the Flint WTP. MDEQ notes chloride in Flint WTP-treated water is within public health guidelines.
  17. October 14, 2014: Valerie Brader, State Deputy Legal Counsel and Senior Policy Advisor, e-mails Governor's Chief of Staff Dennis Muchmore and other top aides arguing for a return to DWSD because of water quality problems. Michael Gadola, then the Governor's Legal Counsel, responds by agreeing with Brader. Brader and Rich Baird, another senior aide to

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the Governor, then discuss the idea with Emergency Manager Darnell Earley, who maintains the water quality problems can be solved and it would be cost-prohibitive to return to DWSD.

18. December 16, 2014: MDEQ notifies Flint of initial quarterly violation of SDWA Disinfection Byproducts (total trihalomethane, or TTHM) requirements.
19. December 31, 2014: First 6-month round of LCR monitoring ends. Using 100 samples not necessarily drawn from highest risk homes (as the LCR intends), the 90th percentile lead level result is 6 parts per billion with 2 samples above action levels for lead (15 parts per billion). Given the 6 ppb result, Flint is disqualified from being exempted and will have to implement corrosion control treatment under the LCR, irrespective of subsequent 6-month monitoring results. MDEQ fails to properly advise Flint WTP of this regulation.
20. January 12, 2015: In response to water quality concerns, the state installs water coolers in state offices in Flint, and state employees are given the option in their offices to use bottled water and provide bottled water to visitors.
21. January 27, 2015: MDHHS epidemiology staff member contacts Genesee County Health Department (GCHD) to recommend that they construct a map of Legionellosis cases and correlate them to the City's water service area.
22. January 2015 (date unclear): Staff from Genesee County hospitals, MDHHS, MDEQ and GCHD meet, and MDHHS Director Nick Lyon directs GCHD to conduct and complete its evaluation of the causes of the increased Legionellosis cases that had begun to occur in 2014.
23. January 27, 2015: FOIA request sent by GCHD environmental hygienist James Henry to Flint DPW and Flint Mayor for information on water treatment to support the county's investigation of Legionellosis cases.
24. January 30, 2015: Brad Wurfel/MDEQ e-mails Dave Murray, Governor Snyder's deputy press secretary, re: *Legionella*, saying said he didn't want MDEQ Director Wyant "to say publicly that the water in Flint is safe until we get the results of some county health department traceback work on 42 cases of Legionellosis in Genesee County since last May."
25. February 25, 2015: LeeAnne Walters contacts EPA Region V regarding high levels of lead (104 ppb) found in drinking water at her home.
26. February 26, 2015: Initial EPA-MDEQ correspondence regarding elevated lead in sample collected from LeeAnne Walters's house. Jennifer Crooks/EPA speculates Flint River water chemistry is leaching contaminants from pipes; this prompts the EPA's initial query of MDEQ about whether optimized corrosion control treatment (OCCT) is in place at the Flint WTP.
27. February 26, 2015: Mike Prysby/MDEQ emails Jennifer Crooks/EPA indicating that all other samples in the monitoring period for July 1, 2014 through December 31, 2014 are below the EPA action level of 15 ppb.
28. February 27, 2015: Miguel Del Toral/EPA, in e-mails to MDEQ and EPA staff, mentions possibility of biasing lead results low by collecting samples after flushing water through the taps; asks again about Flint OCCT, saying "they are required to have OCCT in place."

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29. February 27, 2015: Stephen Busch/MDEQ e-mails Jennifer Crooks and Miguel Del Toral/EPA saying that the 90<sup>th</sup> percentile is 6 ppb for the monitoring period July 1-December 31, 2014 and that Flint has an optimized corrosion control program, and talks about EPA regulations requiring targeted sample pool to focus on highest risk homes.
  30. March 3, 2015: In response to local complaints regarding drinking water quality and related health effects, Flint EM Ambrose cites \$12 million in costs associated with returning to DWSD.
  31. March 12, 2015: Stephen Busch/MDEQ e-mails colleagues stating that there is no confirmation of *Legionella* in the water supply. No test data are provided to substantiate this statement.
  32. March 13, 2015: Brad Wurfel/MDEQ e-mails Harvey Hollins/Governor's office and Dan Wyant/MDEQ noting uptick in Legionellosis cases, placing responsibility for follow-up on GCHD, and discounting GCHD environmental hygienist Jim Henry's concerns about a possible relationship between uptick in Legionellosis and change in water source.
  33. March 13, 2015: Stephen Busch/MDEQ e-mails Jim Henry/GCHD stating there is unlikely to be *Legionella* at the Flint WTP, but that water main breaks and leaks may permit entry of *Legionella* into the water supply. Busch advises contacting MDHHS, but does not himself contact MDHHS.
  34. March 30, 2015: MDEQ notifies Flint of results of first 6-month lead and copper monitoring period (July-December 2014) showing 6 ppb result.
  35. March 31, 2015: Jennifer Crooks/EPA corresponds with MDEQ regarding a conference call that focused on increased cases of Legionellosis.
  36. April 25, 2015: Miguel del Toral/EPA e-mails Pat Cook/MDEQ, questions how a large water system can be deemed to have optimal corrosion control without treatment, cites federal regulations that provide the only two scenarios for large systems to be deemed to have optimized corrosion control, and shows that Flint does not meet either of the two scenarios.
  37. April 27, 2015: Miguel Del Toral/EPA e-mails Tom Poy/EPA and other colleagues stating that Pat Cook/MDEQ has confirmed the Flint WTP has no corrosion control treatment (CCT), which is "very concerning given the likelihood of lead service lines in the city."
  38. April 27, 2015: Laurel Garrison/CDC e-mails GCHD stating that the Legionellosis outbreak in Genesee County is "very large, one of the largest in the past decade."
  39. April 27, 2015: Miguel Del Toral/EPA visits LeeAnne Walters's house to inspect plumbing and deliver sampling bottles.
  40. April 27, 2015: Pat Cook and Stephen Busch/MDEQ exchange e-mails complaining about Del Toral/EPA's questions on corrosion control treatment.
  41. May 29, 2015: MDHHS's Surveillance of Infectious Diseases and Epidemiology team produces a report regarding Legionellosis cases in Genesee County in 2014-2015; the conclusion of the report is that "the outbreak is over."<sup>19</sup>

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<sup>19</sup> Of the Legionellosis cases in 2014-2015, 42 percent had healthcare (hospital) contact; 47 percent had contact with the Flint water supply. The report indicates that the lack of clinical specimens from patients prohibited

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42. June 24, 2015: Miguel Del Toral (EPA) provides Tom Poy/EPA his “Interim Report: High Lead Levels in Flint, Michigan,” summarizing information and concerns about lead levels in drinking water in Flint.
  43. June 10, 2015: EPA/MDEQ conference call includes discussion of the fact that Flint does not have CCT in place.
  44. June 25, 2015: Adam Rosenthal/MDEQ e-mails Mike Glasgow and Brent Wright/Flint Utilities Department (copying Mike Prysby and Stephen Busch/MDEQ) reminding them that 61 more lead and copper samples need to be collected and sent to the lab by June 30, 2015, “and that they are will be [sic] below the AL [action level] for lead. As of now with 39 results, Flint’s 90th percentile is over the AL for lead.”
  45. July 7, 2015: MDEQ is contacted by the American Civil Liberties Union regarding a draft letter from Miguel Del Toral/EPA to LeeAnne Walters that raises concerns about possible leaching of lead from service lines without appropriate corrosion control.
  46. July 10, 2015: Susan Hedman/EPA Region 5 (based in Chicago) writes to Flint Mayor Walling to say that EPA will work with MDEQ on issues related to lead in water.
  47. July 22, 2015: Governor Snyder’s chief of staff Dennis Muchmore e-mails director of MDHHS expressing that many members of the Flint community are raising concerns about water but feel they are not being heard.
  48. July 23, 2015: Linda Dykema/MDHHS e-mails Deputy Director of Population Health and Community Services Susan Moran and others at MDHHS (though not Director Lyon) stating that she has corresponded with MDEQ and that there has been no change in compliance regarding Flint water quality and appropriate state and federal law, and that Miguel Del Toral/EPA “acted outside of his authority” (these are MDEQ talking points).
  49. July 24, 2015: In response to Muchmore e-mail, Brad Wurfel/MDEQ writes, “The bottom line is that the residents of Flint do not need to worry about lead in the water supply, and MDEQ recent sampling does not indicate eminent [sic] health threat from lead.” Muchmore responds, “Thanks.”
  50. July 28, 2015: MDHHS epidemiologist Cristin Larder finds that children’s blood lead tests conducted in summer 2014 “lie outside the control limit” compared with prior years and that this finding “does warrant further investigation.” On the same day, CLPPP data manager Robert Scott analyzes the data over a 5-year period and concludes that “water was not a major factor.” Later that day, CLPPP manager Nancy Peeler concludes that the lack of persistently elevated blood lead levels in children in Flint beyond the summer months indicates no connection to the change in water in Flint in 2014. Larder then receives email communication from Peeler: Peeler has concluded from CLPPP data and communicated with MDHHS leadership that there is no problem with children’s lead levels in Flint.
  51. August 27, 2015: Virginia Tech professor Marc Edwards releases his first set of findings regarding tests of water in Flint. Over half of 48 samples have lead levels of more than 5 parts per billion (ppb) and 30 percent of samples have lead levels greater than 15 ppb.
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testing that could have made a definitive link to the water supply as a source of *Legionella*. It indicates that there should be vigilance in 2015 regarding possible new cases of Legionellosis, including collection of clinical specimens.

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52. August 31, 2015: EPA/MDEQ conference call: second 6-month monitoring test results for January 1-July 31, 2015 indicate 90<sup>th</sup> percentile at 11 ppb. It is determined that CCT is needed and implementation steps are delineated.
  53. August 31, 2015: Brad Wurfel/MDEQ raises concerns about Professor Edwards's tests and accompanying media coverage to MDEQ, Muchmore, Harvey Hollins, Dave Murray and Sara Wurfel of Governor's office. There is no apparent communication with MDHHS regarding this issue.
  54. September 8, 2015: Virginia Tech posts to FlintWaterStudy.org sample testing results on 252 samples of 300 sample kits provided. The Virginia Tech researchers concluded that: "mathematically, even if the remaining 48 samples returned have non-detectable lead... FLINT HAS A VERY SERIOUS LEAD IN WATER PROBLEM." Of the 252 water samples, 101 have lead in excess of 5 ppb. Flint's 90th percentile in Edwards' survey was 25 ppb. Several samples were over 100 ppb and one of the samples as over 1,000 ppb.
  55. September 9-12, 2015: MDHHS begins to develop educational program materials for the public regarding reducing the risk of lead exposure for children, in response to media coverage of Professor Edwards's water testing results.
  56. September 22, 2015: Dr. Mona Hanna-Attisha, director of the pediatric residency program at Hurley Medical Center, contacts Robert Scott/MDHHS to request access to the state's childhood lead testing records. This is a similar request to one filed by Professor Edwards several weeks before, to which the state had yet to respond. No data are shared.
  57. September 23, 2015: Nancy Peeler/MDHHS, director of the state's Childhood Lead Poisoning Prevention Program (CLPPP), e-mails Robert Scott/MDHHS to consider re-running the analysis that had been conducted in July, and asks for formal epidemiologic help. Later that day, Mikelle Robinson/MDHHS writes to colleagues that the Governor's office briefing maintains that Flint water does not represent an "imminent public health problem."
  58. September 24, 2015: Dr. Hanna-Attisha presents her findings about children tested for lead in a press conference at Hurley Medical Center, reporting that the proportion of children with elevated blood lead levels has increased since the switch to the Flint River water source in April 2014. MDHHS issues comments emphasizing differences between the Hurley analysis and preceding internal analyses by MDHHS that were not shared publicly. That same day, Robert Scott/MDHHS writes in an internal memo that he sees patterns in blood lead levels similar to what Dr. Hanna-Attisha has reported.
  59. September 28, 2015: MDHHS Director Nick Lyon calls for analysis of the blood lead levels in order to "make a strong statement with a demonstration of proof that the blood lead levels seen are not out of the ordinary." No such analysis is ever provided. Later that day, Governor Snyder is briefed by staff that the Flint water system is in compliance.
  60. September 29, 2015: The *Detroit Free Press* publishes an analysis of Flint blood lead tests, concluding that Dr. Hanna-Attisha's analysis is correct. GCHD issues a health advisory regarding the water quality. Governor Snyder's office contacts Director Wyant and Director Lyon to consider emergency responses.
  61. October 1, 2015: MDHHS issues a statement confirming Dr. Hanna-Attisha's analysis.
  62. October 16, 2015: Flint switches back to DWSD as source of drinking water for the city.

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## Regulatory Context

The federal Safe Drinking Water Act<sup>20</sup> (SDWA) was enacted in 1974 and governs regulation of drinking water throughout the United States. It has been amended multiple times since its enactment, most recently in 2015. From the United States Environment Protection Agency (EPA) website:

*“The Act authorizes EPA to establish minimum standards to protect tap water and requires all owners or operators of public water systems to comply with these primary (health-related) standards. The 1996 amendments to SDWA require that EPA consider a detailed risk and cost assessment, and best available peer-reviewed science, when developing these standards. State governments, which can be approved to implement these rules for EPA, also encourage attainment of secondary standards (nuisance-related).”<sup>21</sup>*

Michigan enacted the state Safe Drinking Water Act (PA 399) in 1976. It establishes state authority for regulating drinking water supplies in Michigan. It also provides the statutory basis for the EPA’s delegation to the Michigan Department of Environmental Quality (MDEQ) to implement the federal SDWA, including the Lead and Copper Rule (LCR).

### Lead and Copper Rule

The Lead and Copper Rule (LCR), promulgated in 1991,<sup>22</sup> falls under the SDWA. Short-term revisions, prompted following the incidence of elevated lead levels in the District of Columbia’s water distribution system, were published in the Federal Register in 2007.<sup>23</sup> From the guidance to the states on the rule:

*The goal of the LCR is to provide maximum human health protection by reducing lead and copper levels at consumers' taps to as close to the [Maximum Contaminant Level Goals] MCLGs as is feasible. To accomplish this goal, the LCR establishes requirements for community water systems (CWSs) and non-transient non-community water systems (NTNCWSs) to optimize corrosion control and conduct periodic monitoring. Systems are required to perform public education when there are lead action level exceedances at more than 10 percent of the taps that are sampled, treat source water if it contributes significantly to lead and copper levels at the tap, and replace lead service lines in the distribution system if the lead level at the tap continues to exceed the action level after optimal corrosion control and/ or source water treatment has been installed.”<sup>24</sup>*

The MCLG for lead in water is 0 milligrams per liter (mg/L); the action level requiring public notification of exceedance is 0.15 mg/L (also expressed as 15 parts per billion).

Large water systems, defined as those serving over 50,000 people, were required to have optimal corrosion control treatment (OCCT) by 1997. The rule requires large water systems that have met

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<sup>20</sup> 42 U.S.C. §300f et seq., 1974

<sup>21</sup> [www.epa.gov/laws-regulations/summary-safe-drinking-water-act](http://www.epa.gov/laws-regulations/summary-safe-drinking-water-act)

<sup>22</sup> 56 FR 26460, June 7, 1991

<sup>23</sup> 72 FR 57782, October 2007

<sup>24</sup> LCR Short-Term Revisions State Implementation Guidance-Final June 2008

the OCCT requirements through the installation of corrosion control treatment to continue to operate and maintain that treatment.<sup>25</sup>

Currently, EPA is in the process of reviewing and revising the LCR through its established rulemaking procedures.

### **Public Health Context**

Flint is now confronted by public health challenges: mitigating the effects of toxic lead exposure and ensuring an appropriate case-tracking and containment response to the outbreak of Legionellosis in Flint. Several attributes of these public health challenges are particularly noteworthy and informed our findings and recommendations:

#### **Lead Exposure**

Lead is a potent neurotoxin. For any given exposure, lead has more profound health effects in children because the exposure is distributed throughout the body's volume. Children's smaller body volumes convey larger risks from lead exposure; these effects are concentrated in brain cells.

One of the most concerning aspects of lead exposure is that once it has been deposited in the nervous system, lead cannot be removed. The impact of lead poisoning on neurological development is permanent. Recent research has indicated that, with each 1 microgram per deciliter increase in blood lead level, children demonstrate decreasing performance on intelligence tests.<sup>26</sup>

Given the neurotoxicity of lead, for many decades medicine and public health experts have focused on how to reduce lead exposure, particularly for children. Known historical sources of lead include lead in paint, lead in gasoline, and lead in water sources.<sup>27</sup> Major federal laws have addressed these sources by prohibiting lead in paint, prohibiting lead in gasoline, and requiring corrosion control and testing of public drinking water sources to identify lead contamination in water (via the LCR, above).

In Michigan, prior to the Flint water crisis, trends in lead test results for children had told a story of public health progress. As recently as the late 1990s, almost 50 percent of young children (ages 1 to 2) in Michigan had blood lead levels of 5 micrograms per deciliter or above. By 2013, fewer than 5 percent of young children in Michigan had levels of 5 micrograms per deciliter or above.<sup>28</sup> This downward trend mirrors similar improvements in communities across the United States.

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<sup>25</sup> 40 CFR 141.82 (g) *Continued operation and monitoring*. All systems optimizing corrosion control shall continue to operate and maintain optimal corrosion control treatment, including maintaining water quality parameters at or above minimum values or within ranges designated by the State under paragraph (f) of this section, in accordance with this paragraph for all samples collected under §141.87(d) through (f).

<sup>26</sup> Citations offered in "Elevated Blood Lead Levels in Children Associated With the Flint Drinking Water Crisis: A Spatial Analysis of Risk and Public Health Response," by Mona Hanna-Attisha, MD, MPH; Jenny LaChance, MS; Richard Casey Sadler, PhD; and Allison Champney Schnepf, MD, *American Journal of Public Health*, November 2015.

<sup>27</sup> For a discussion of the prevalent use of lead in the United States and the lead industry's conduct in light of the determination of its toxicity, see *Lead Wars: The Politics of Science and the Fate of America's Children* (2013), by Gerald Markowitz and David Rosner, who are interviewed on National Public Radio's *Fresh Air* in a March 3, 2016 episode titled, "America's 'Lead Wars' Go Beyond Flint, Mich.: 'It's Now Really Everywhere.'"

<sup>28</sup> Known as the "reference level" as stated by the federal Centers for Disease Control and Prevention.

These improvements have largely been attributed to reductions in lead paint in households rather than reductions in lead exposure through drinking water.

In Michigan, routine blood lead level checks are recommended for children 1 to 2 years old who live in communities that are known to have historically high proportions of children with levels at the reference level or higher, and for all children with Medicaid health coverage. For the past decade, Flint has been one of 14 Michigan communities that have been identified by MDHHS as “focus communities” because of historically high levels of children with elevated blood lead levels. Local and state health agencies are responsible, in coordination with children’s healthcare providers (physicians, nurse practitioners, etc.), for following up on elevated blood lead levels. Appropriate follow-up includes:

- Providing advice to families regarding increasing the nutritional quality of the child’s diet to increase the amount of foods with high levels of iron, calcium, and vitamin C;
- Rechecking blood lead levels within 3 to 6 months to see whether the level has decreased below 5 micrograms per deciliter, and continuing interventions and re-testing at this interval to assure progress; and
- Performing in-home assessments for environmental sources of lead (for example, lead paint, lead in dust) for children with blood lead levels of 10 micrograms per deciliter or more.<sup>29</sup>

Of note, before the Flint water crisis, in-home assessments did not routinely include testing of drinking water as a potential source of lead exposure.

### **Legionella**

Infections caused by *Legionella* bacteria can cause relatively mild illness in generally healthy adults but can cause life-threatening illness and even death in elderly and immune-compromised patients. Such infections almost never occur in children. Legionellosis, the name given to infections caused by *Legionella* bacteria, has been recognized since the 1970s as often occurring in environments with self-contained air supply systems (such as healthcare facilities) during non-winter months when cooling towers for air conditioning can serve as breeding grounds for the bacteria. Historically, Legionellosis is fatal in approximately 10 percent of cases.

Legionellosis is a reportable disease, meaning that infections with *Legionella* must be reported to local and state public health authorities. Public health specialists known as epidemiologists conduct analyses of cases, especially when the pattern of cases exceeds historical levels in a given jurisdiction.

Prior to the switch to the Flint River as a source of drinking water in 2014, the number of cases of Legionellosis in Genesee County had not exceeded 10 cases per year for several years. From June 2014 to March 2015, there were 45 cases of Legionellosis in Genesee County, with 5 deaths. This was described by an expert from the CDC in 2015 as “one of the largest [outbreaks of Legionellosis] in the past decade.” About 40 percent of the cases had known exposure to possible

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<sup>29</sup> Prior to the Flint water crisis, environmental assessments were not performed for children with blood lead levels of 5 to 9 micrograms per deciliter, but only for children with blood lead levels of 10 micrograms per deciliter or higher.

healthcare sources of *Legionella*; almost 50 percent of cases had known exposure to Flint River-sourced water supply.<sup>30</sup>

According to the MDHHS report issued on May 29, 2015, it was not possible for the state epidemiologists to draw definitive conclusions that the change in water supply was related to the outbreak of disease, given the lack of clinical specimens of *Legionella* from patients diagnosed with the disease in 2014-15. It is speculated that clinical respiratory specimens (sputum) were not available because antibiotic treatment was started presumptively after a positive urine test for *Legionella*, rendering any subsequent specimens indeterminate. Although urine specimens can confirm a diagnosis of Legionellosis, urine specimens cannot be used for determining the source of *Legionella*.

Subsequent data reported publicly by MDHHS on January 21, 2016, indicated that there were 42 additional cases of Legionellosis from May 2015 through October 2015, with 4 deaths.<sup>31</sup> Taking the 2014-15 data together with additional 2015 data, MDHHS reported that 36 percent of cases likely were exposed to Flint River-sourced drinking water, and that again there were too few clinical specimens to draw definitive conclusions about contaminated water as the source of infection in these cases.

At the time of this report, the pattern of an abrupt increase in cases of Legionellosis in Genesee County in 2014-15 that occurred after a shift to the Flint River strongly implicates the water source and treatment of the water as a potential cause of higher Legionellosis case incidence. EPA experts Del Toral and Lytle have suggested that the treated water from Flint WTP has disrupted the previously stable lining and “biofilm” of water lines to such an extent that chlorine in the water supply has been excessively depleted. Del Toral also suggested that the flushing of fire hydrants may have stripped the biofilm and released bacteria (*Legionella*) that the biofilm had contained. If true, this may have led to a situation where *Legionella* may grow more abundantly than in a distribution system conveying properly treated drinking water.

Unfortunately, these are hypotheses. Definitive data for the analysis of cases in 2014 and 2015 are not available, so it is not possible to be conclusive about the cause. Nonetheless, great concern should remain about the clustering of cases among patients potentially exposed in healthcare facilities in the City of Flint and cases among individuals whose homes receive water from the Flint WTP.

MDHHS and GCHD have indicated that they will have a high level of vigilance in monitoring for cases of Legionellosis in 2016. They have reminded healthcare professionals treating patients in Genesee County to obtain appropriate clinical (respiratory) specimens in suspected cases of Legionellosis before initiating treatment. This cooperation between public health and medical professionals will be crucial to identifying the cause of future Legionellosis cases in Genesee County and controlling outbreaks in the future. In addition, a team of scientists from multiple

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<sup>30</sup> Some of these cases had exposure to both Flint River water and to healthcare facilities.

<sup>31</sup> Twenty-two of the 42 cases reported from May-October 2015 had known healthcare-related exposures in the two weeks prior to development of symptoms, and 21 of these were from the same healthcare facility. Sixteen of the 42 cases of Legionellosis in Genesee County from May-October 2015 were in individuals who had neither exposure to a healthcare facility nor exposure to Flint River-sourced water.

Michigan universities is expected to test Flint drinking water in 2016 to assess whether conditions in the system created an environment that heightened the likelihood of *Legionella* contamination.

## Roles of Government Entities in the Flint Water Crisis

Many individuals, agencies and groups participated in the events leading to the Flint water crisis and the subsequent response. Their various roles and responsibilities have been subjects of considerable discussion and debate. In the subsequent sections, we describe the defined (or statutory) roles of many of these parties, as well as the nature of their involvement in the Flint water crisis. Findings and recommendations are also provided.

The water crisis in Flint is effectively elevating public awareness of the latent dangers associated with lead in water systems, which regulators and many water utilities historically have been reluctant to address beyond the addition of corrosion control treatment. As it responds to the acute crisis in Flint, the State of Michigan is in a position to set important precedents that may have application well beyond the state, as more utilities and regulatory agencies prepare for more aggressive approaches to address the problem of lead in water. This opportunity is noted in several of the recommendations provided below.

### Michigan Department of Environmental Quality (MDEQ)

#### *Defined Role*

MDEQ is responsible for enforcement of the SDWA (including the Lead and Copper Rule (LCR)), the Clean Water Act (CWA) and other environmental regulations in the State of Michigan. With respect to drinking water, MDEQ's stated goal is that "Michigan's water resources are clean and safe" and a measure of success towards that goal is that "100 percent of the population has safe drinking water with no reported violations of health based standards."<sup>32</sup> The agency's responsibility for SDWA compliance enforcement derives from it, like all other states except Wyoming, being delegated "primacy" by the EPA.

Within the MDEQ, the Office of Drinking Water and Municipal Assistance (ODWMA) has responsibility for SDWA enforcement and lending assistance to public water suppliers. The ODWMA Community Water Supply Program's "primary function is regulatory oversight of approximately 1,425 community public water supplies in Michigan."<sup>33</sup> The Community Water Supply Program provides capacity development and operator training and certification, operates certified laboratories, and monitors and reports on public water system violations. ODWMA staff who regulate compliance with the SDWA are not required to be licensed operators or have experience with drinking water treatment plant or distribution system operations.

For many communities, ODWMA has been and continues to be relied upon to provide technical assistance and guidance on water treatment processes, approaches to managing distribution

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<sup>32</sup> "Sustaining Michigan's Water Heritage: A Strategy for the Next Generation, Draft for Public Review," June 4, 2015. Prepared by the Michigan Office of the Great Lakes, in collaboration with Michigan Department of Environmental Quality, Michigan Department of Natural Resources, Michigan Department of Agriculture and Rural Development, and Michigan Economic Development Corporation, p. 6.

<sup>33</sup> [www.michigan.gov/deq/0,1607,7-135-3313\\_3675\\_3691---,00.html](http://www.michigan.gov/deq/0,1607,7-135-3313_3675_3691---,00.html)

system water quality, and overall utility management. ODWMA historically has taken a collaborative approach with public water suppliers, offering guidance on technical requirements for compliance with environmental regulations.

### *Discussion*

MDEQ is responsible for ensuring that community water systems comply with the SDWA. According to EPA Region V, ODWMA, which was originally within the state Department of Community Health, has more community water systems to regulate than other Region V states. Additionally, while all states' water system regulators in Region V are stretched financially, Michigan is particularly challenged because fees to operate the program are generally lower than fees charged by other states, requiring the state to rely more heavily on general funds and federal revenue.

For a variety of reasons, MDEQ discounted use of the Flint River as a permanent water source in 2013. However, it did agree to use of the river as a temporary source, conditioned upon completion of identified improvements to the Flint Water Treatment Plant (WTP). Flint was granted two permit modifications in April 2014 that allowed the treatment plant to operate full-time with the Flint River as the water source.

In advance of the City of Flint's conversion from DWSD water supply to use of Flint River water, MDEQ had multiple communications and meetings with Flint Utilities Department staff and their consultants. A plan of treatment of Flint River water was discussed and covered numerous issues including dosing of chemicals, use of polymers, and unit process performance. When asked by Flint water plant personnel about adding phosphate in the treatment process, as DWSD does for corrosion control, MDEQ said that a corrosion control treatment decision would be made after two 6-month monitoring periods were conducted to see if corrosion control treatment was needed. Similarly, distribution system operations requirements were outlined, including sampling and testing for compliance with the LCR that involved obtaining tap water samples from high-risk residences. ODWMA anticipated that use of Flint River water would be problematic<sup>34</sup> but deferred to state emergency manager decisions to proceed.<sup>35</sup> Subsequently:

- MDEQ advised Flint WTP staff, in contradiction to longstanding federal policy under the LCR, that corrosion control treatment was not required.
- MDEQ did not require appropriate sampling of tap water quality as mandated by the LCR.
- MDEQ obstinately used water quality test results based on flawed sampling and insisted on the accuracy of the erroneous data.
- MDEQ dismissed expressed concerns of Flint residents, elected officials, and external subject matter experts (as well as EPA).

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<sup>34</sup> Internal March 26, 2013 MDEQ e-mail (Busch to Wyant, Shekter Smith, and others) noting, among other points: "Continuous use of the Flint River at such demand rates would: Pose an increased microbial risk to public health (Flint River vs. Lake Huron source water), Pose an increased risk of disinfection by-product (carcinogen) exposure to public health (Flint River vs. Lake Huron source water), Trigger additional regulatory requirements under the Michigan Safe Drinking Water Act."

<sup>35</sup> Internal March 27, 2013 MDEQ e-mail (Sygo to Busch) noting, among other points: "As you might guess we are in a situation with Emergency Financial Managers so it's entirely possible that they will be making decisions relative to cost. The concern in either situation is that a compliant supply of source water and drinking water can be supplied."

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- MDEQ inaccurately reported information about Flint’s corrosion control to EPA, stating that Flint had an optimized corrosion control program when, in fact, it was not employing corrosion control treatment.
  - MDEQ deferred requiring Flint to implement CCT until after the second 6-month monitoring period was completed and showed lead levels of 11 ppb, though EPA advised MDEQ to require Flint to have CCT as early as April 2015.
  - MDEQ waited on legal opinions about SDWA compliance requirements and delayed admission of its incorrect interpretation of SDWA compliance requirements for (at least) 2 months.
  - MDEQ insisted, even after compelling evidence of lead poisoning of children was presented, that Flint water quality met applicable SDWA standards.
  - MDEQ failed (for more than a year) to work with MDHHS leadership and staff to ensure an appropriate and comprehensive public health response to repeated requests to address health concerns related to drinking water. MDEQ continued to insist the water was safe and met all federal requirements, and discouraged any statements that would imply that the water was not safe.

The obvious question that MDEQ, along with the City and its consultants, should have asked was: “What will happen without corrosion control treatment?” Similarly, they could have asked why a less corrosive source of water (Lake Huron water) would be required to have corrosion control treatment, but not the more corrosive Flint River source. In Flint, the more corrosive water source ultimately destroyed the protective scaling on pipes and plumbing that orthophosphate addition had provided through the water supplied by DWSD.

### **Findings**

The FWATF, as stated in our second letter to Governor Snyder,<sup>36</sup> places primary responsibility for the Flint water crisis on the MDEQ, and specifically its ODWMA. This finding is based on numerous interviews and reviews of publicly available documents. Nothing in our subsequent interviews or our review of thousands of pages of related documents has dissuaded us from this fundamental conclusion. We found that:

- F-1. MDEQ bears primary responsibility for the water contamination in Flint.
- F-2. MDEQ, specifically its ODWMA, suffers from cultural shortcomings that prevent it from adequately serving and protecting the public health of Michigan residents.
- F-3. MDEQ misinterpreted the LCR and misapplied its requirements. As a result, lead-in-water levels were under-reported and many residents’ exposure to high lead levels was prolonged for months. Specifically:
  - MDEQ’s misinterpretation of the LCR and lack of due caution resulted in the decision not to require corrosion control upon the switch to the Flint River but, rather, to begin two consecutive 6-month water quality monitoring periods.
  - MDEQ failed to promptly require corrosion control even after the initial 6-month monitoring period results were received and 90<sup>th</sup> percentile lead sampling results were at 6 ppb, which would have disqualified Flint from being exempted from

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<sup>36</sup> See Appendix II for copies of the FWATF’s letters to Governor Rick Snyder.

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having to have corrosion control treatment—even under MDEQ’s flawed interpretation.

- MDEQ’s guidance to Flint on LCR compliance sampling techniques (calling for pre-flushing, use of small-mouthed bottles, etc.), while possibly technically permissible, was not designed to detect risks to public health. MDEQ failed to take adequate steps to correct Flint water operations staff’s inaccurate LCR sampling.
  - MDEQ ODWMA advised Flint Utilities Department personnel to make sure the rest of the water samples in the second 6-month monitoring period were clean, since the samples they had already submitted exceeded EPA’s action level for lead.
  - MDEQ conveniently, and without adequate investigation, excluded LeeAnne Walters’s water quality test results for purposes of determining whether Flint sampling results exceeded EPA’s action level.
- F-4. MDEQ waited months before accepting EPA’s offer to engage its lead (Pb) experts to help address the Flint water situation and, at times, MDEQ staff were dismissive and unresponsive.
- F-5. MDEQ failed to move swiftly to investigate, either on its own or in tandem with MDHHS, the possibility that the Flint water system was contributing to an unusually high number of Legionellosis cases in Flint.

MDEQ caused this crisis to happen. Moreover, when confronted with evidence of its failures, MDEQ responded publicly through formal communications with a degree of intransigence and belligerence that has no place in government. These failures are not diminished, nor should focus on them be deflected, by the fact that other parties contributed to the disastrous decisions or the prolonging of their consequences.

### **Recommendations**

- R-1. Implement a proactive, comprehensive cultural change program within MDEQ, specifically its ODWMA, to refocus the department on its primary mission to protect human health and the environment. MDEQ should aspire to become a national leader through a proactive program designed to detect and address contaminants in public water supplies in a timely manner.<sup>37</sup>
- ODWMA should heighten its focus on protection of public health and provide technical assistance to advance public water system performance.
  - Technical assistance should not be oriented toward defining minimum requirements to achieve technical compliance with regulatory requirements.
  - In the event that regulatory requirements are ambiguous, ODWMA should default to public health protection.

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<sup>37</sup> For example, in the case of lead detection, ODWMA’s program should have adopted water quality sampling procedures that maximized the potential for detection by identifying high-risk homes, prohibiting pre-flushing of service lines, and improving sample draw procedures.

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- MDEQ's program restructuring should address the findings of this and other program and incident reviews, and commit to transparent, accessible reporting on implementation of associated recommendations.
- R-2. Establish an apprenticeship/certification program for MDEQ ODWMA employees that requires direct, hands-on experience with public water system operations. MDEQ ODWMA employees responsible for water system regulation and SDWA enforcement should be, or have access to, certified operators and subject matter experts (including, for example, those at EPA).
- R-3. Strengthen SDWA enforcement, most notably for the LCR. The state has the ability to strengthen its own enforcement of the SDWA and not wait for action to occur at the federal level:
- Reiterate (and clarify where necessary) appropriate sampling procedures, and establish them in rule revisions or guidelines such that they are clear for all to understand. Provide resources for public water systems to obtain authoritative guidance in the event of questions or concerns.
  - Make water sample test results required under the Lead and Copper Rule available to the public while protecting personally identifiable information.
- R-4. Participate in the Flint Water Inter-Agency Coordinating Committee's (FWICC's) work team established to oversee conversion from DWSD-supplied to KWA-delivered water. MDEQ should draw from that work to revise its policies and procedures for approval of water treatment and distribution system operating regimens, particularly when source water changes are contemplated.
- R-5. Participate in EPA's ongoing review and revision of the LCR, conveying lessons learned from the Flint water crisis.<sup>38</sup>

## Michigan Department of Health and Human Services (MDHHS)

### *Defined Role*

The Michigan Department of Health and Human Services (MDHHS)<sup>39</sup> is responsible for addressing all matters of public health for the population of the state. MDHHS works to achieve this goal through a combination of primary prevention—preventing illnesses before they occur<sup>40</sup>—and secondary prevention—reducing the burden of disease once it has occurred.<sup>41</sup>

Meeting the responsibilities of MDHHS requires constant attention through surveillance programs and effective communication and coordination with public health partners at multiple levels of government (city, county, federal). MDHHS conducts surveillance for dozens of diseases

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<sup>38</sup> Also applicable for recommendations related to the LCR offered in the report section on the EPA and LCR.

<sup>39</sup> Created from the combination of the Department of Community Health and Department of Human Services in 2015.

<sup>40</sup> For example, promoting and facilitating childhood vaccination against diseases such as measles and influenza.

<sup>41</sup> For example, conducting screening programs to identify individuals who have developed cancer so that they can receive appropriate medical care.

and health conditions through a wide variety of efforts. For instance, MDHHS is recognized for a high-quality system of tracking childhood vaccination through the Michigan Care Improvement Registry (MCIR). MCIR allows state officials to assess children's vaccination levels on a regular (weekly) basis, and to identify neighborhoods and schools where vaccination levels may be so low that outbreaks of vaccine-preventable diseases are possible. As a result, MDHHS can then communicate with healthcare professionals who administer vaccines, and with parents of children who are not up-to-date on their vaccinations, to encourage them to protect their children against disease.

MCIR is a very positive example of the public health function of MDHHS. In the case of Flint, however, MDHHS's response to two public health concerns, related to lead exposure and cases of *Legionella* infection, did not meet the agency's own standard of performance.

## Discussion

### Children's Exposure to Lead in Drinking Water

MDHHS includes the Childhood Lead Poisoning Prevention Program (CLPPP), which is responsible for tracking the results of all children's blood lead tests, and the Healthy Homes program, which is responsible for coordinating remediation of homes when high levels of environmental lead exposure are found for a child with an elevated blood lead level. All blood lead tests conducted in the state must be reported to CLPPP, under state law. For many years, CLPPP has functioned as a registry of blood lead tests, comparing aggregate results at the state level in the most recent year to levels in prior years—typically in annual reports released in the summer following the end of a given calendar year. The primary outcomes reported have been the proportions of children with blood lead levels  $\geq 10$  micrograms per deciliter and proportions with blood lead levels  $\geq 5$  micrograms per deciliter. For more than a decade, CLPPP has also specifically tracked local lead testing results in 14 "focus communities" known to have higher proportions of children with elevated blood lead levels than in other communities in Michigan. Flint is one such focus community.

The CLPPP operated under the assumption that children with elevated blood lead levels were being managed by their respective healthcare professionals. Therefore, no urgency was given to performing the comparisons that they published in annual reports, which were posted online without any public announcements. For this reason, there is no evidence that MDHHS conducted an analysis of blood lead levels in 2014 prior to late July 2015, after Governor Snyder's chief of staff Dennis Muchmore wrote to MDHHS officials expressing concern about many complaints from Flint residents about water quality in Flint.

On July 28, 2015, a MDHHS epidemiologist (Larder) performed a classic epidemiologic analysis of 2014 blood lead test data versus prior years and found a concerning pattern of elevated levels in Flint. On the same day, the CLPPP data manager (Scott) compared data over the preceding 5 years and concluded that the 2014 data were not substantially different than several preceding years. Scott's analysis was fundamentally flawed because he failed to consider that the proportions of children with high blood lead were declining over the years 2011-2013, and therefore 2014 levels represented a clear deviation from the improving trend in previous years. For unclear reasons, these conflicting conclusions of Scott and Larder were not elevated to higher levels of authority within MDHHS. Rather, the explanation that there was no difference (from a data manager rather than an epidemiologist) was allowed to persist for another 2 months. Messages from other MDHHS officials over that subsequent time period indicated that they were

aware of the MDEQ narrative that the water in Flint was “safe” and did not present “an imminent public health problem.”

By September 2015, Dr. Mona Hanna-Attisha released her analysis of blood lead tests performed at Hurley Medical Center, showing that children’s blood lead levels were clearly abnormal at a higher rate than in prior years. Of note, Dr. Hanna-Attisha and Professor Marc Edwards of Virginia Tech had formally requested release of CLPPP data from MDHHS (Scott) in previous weeks and months, but had never received such data, leading Dr. Hanna-Attisha to analyze data from Hurley Medical Center only. When the Hurley data were released, MDHHS issued statements indicating that the Hurley data were analyzed using different methodology than the state would employ, and MDHHS did not endorse the Hurley findings. A few days later, MDHHS Director Lyon sent a memo to MDHHS staff asking them to “make a strong statement with a demonstration of proof that the blood lead levels seen are not out of the ordinary.” Within a few days, MDHHS epidemiologists had re-analyzed the data and reversed course, agreeing publicly with the Hurley-based analysis by October 1, 2015.

Subsequently, MDHHS changed its approach and began to analyze blood lead level data in the CLPPP database on a basis closer to “real time.” In a series of reports released approximately every 2 weeks since November 2015, MDHHS has communicated with the public regarding the proportion of children in Flint with blood lead tests  $\geq 5$  micrograms/deciliter. This is a promising step in transparency and timeliness.

However, excessive and likely harmful lead exposure already has occurred for hundreds and perhaps thousands of children in Flint, and it is now MDHHS’s responsibility to follow up with comprehensive secondary prevention. MDHHS reports that about 200 children in Flint are known to have had childhood lead levels  $\geq 5$  micrograms/deciliter when they were tested since April 2014 (the month of the water switch to the Flint River). This number of children is likely a profound underestimate of the number of children exposed; based on Census estimates and Medicaid records, the number of children under 6 years old living in the City of Flint is approximately 10,900. Given the known risks of lead neurotoxicity for young children, appropriate near-term, middle-term, and long-term follow-up for children exposed to lead in Flint will include:

- Neurodevelopmental assessments,
- Timely access to early childhood education,
- Behavioral assessments and interventions in preschool years,
- Educational assessments in preschool and school years accompanied by appropriate learning support, and
- Appropriate counseling and medical therapy to address attentional and behavioral concerns at school age and into adolescence.

Such comprehensive approaches to secondary prevention for children in Flint are consistent with a model framework for medical and public health response proposed by Dr. Mona Hanna-Attisha at Hurley Medical Center.

Despite the unmistakable connection between the quality of drinking water and public health, there is no liaison between MDEQ and MDHHS to ensure that complaints or concerns about water are brought to the attention of MDHHS staff in a timely fashion to prompt investigative action. The lack of a liaison function within state government also adversely affected the response to cases of Legionellosis, as described below.

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## Cases of Legionella Infection

Legionellosis is an infection with species of bacteria called *Legionella*, so called because it came to prominence when many attendees at an American Legion conference fell ill in 1976.

Legionellosis has a broad spectrum of severity, causing relatively mild illness in some individuals who are generally healthy and causing much more severe illness in seniors and patients whose immune systems are weakened. It is generally fatal in about 10 percent of cases.

*Legionella* bacteria live in water supplies and flourish in warmer temperatures and standing water, present in locations such as cooling towers for air conditioning systems. It is a reportable disease, meaning that any healthcare professional who makes the diagnosis must report the case to the local health department. In turn, the local health department reports cases to the state health department. Fewer than 10 cases of Legionellosis per year were reported by GCHD in years immediately preceding the switch of water source to the Flint River.

MDHHS assisted GCHD with evaluation of the Legionellosis outbreak that began in 2014 and extended into early 2015, at GCHD's request. When the initial evaluation report was issued by MDHHS epidemiology team in May 2015, it is unclear why they asserted the "the outbreak is over"; subsequent reports released in January 2016 indicated that additional cases occurred beginning in May 2015.<sup>42</sup> MDHHS indicated in its May 2015 report that data were inconclusive regarding a community source such as the water supply because of a lack of clinical specimens.

While MDHHS's statement regarding the absence of conclusive evidence of a community source has scientific merit, it is evident that MDHHS was not calibrating its evaluation for the unusual circumstance of the switch to the Flint River in April 2014. In fact, although the report mentions it as a possible source, there is no explicit mention of the switch to a new raw water source in Flint, and new water treatment protocols, as possible causal factors. Although there was a January 2015 meeting that included MDHHS, MDEQ and GCHD regarding cases of Legionellosis in Genesee County, subsequent discussions of Legionellosis appear to have occurred within the silos of MDEQ and MDHHS until late 2015, and remained uncoordinated until the Governor's announcement about ongoing *Legionella* investigations in January 2016.

## Findings

- F-6. MDHHS's lack of timely analysis and understanding of its own data on childhood blood lead levels, along with its reliance on MDEQ and reluctance to share state data with Dr. Mona Hanna-Attisha and Professor Marc Edwards, prolonged the Flint water crisis.
- F-7. MDHHS bears ultimate responsibility for leadership and coordination of timely follow-up efforts in Flint and across the state regarding childhood lead poisoning. While local entities (for example, healthcare professionals, GCHD, health insurance plans) are partners in efforts to protect children from lead poisoning, MDHHS has the lead role and failed to exercise its responsibility.
- F-8. The consequences of lead exposure for Flint residents are expected to be long-term and will necessitate sustained investments in education, public and mental health, juvenile justice, and nutrition needs over the next 10 to 20 years.

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<sup>42</sup> This may have been related to delays in reporting between local healthcare professionals, GCHD, and MDHHS.

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- F-9. Too few children in Michigan are screened for lead through routine blood tests as recommended for children ages 1 and 2. Statewide screening goals for children enrolled in Medicaid are met in very few instances at the county level or within Medicaid health plans. This lack of information leaves parents, healthcare professionals, and local and state public health authorities uninformed about the possibility of lead poisoning for thousands of Michigan children.
- F-10. Coordination between MDEQ and MDHHS was inadequate to properly address the public health issues related to water quality in Flint. Communication was infrequent, and when it did occur, the default position was to conclude that the health problems were not related to the water supply switch – rather than to assume that the problems might be related to the switch.
- F-11. Communication and coordination among local and state public health staff and leadership regarding Legionellosis cases in 2014-2015 was inadequate to address the grave nature of this outbreak. The fact that these cases occurred *while* there were several simultaneous concerns about quality and safety of water in Flint should have caused public health staff and leadership at local and state levels to coordinate their actions to ensure a prompt and thorough investigation.

### Recommendations

- R-6. Establish policies and procedures at MDEQ and MDHHS to ensure input by health experts and scientists when permit decisions may have a direct impact on human health.
- R-7. Establish and maintain a Flint Toxic Exposure Registry to include all the children and adults residing in Flint from April 2014 to present.

The Flint Toxic Exposure Registry will serve as an authoritative reference source of information (including contact details [for example, primary contact information, back-up contact information, and preferred mode of contact]) for purposes of timely health assessments in the short-term and long-term, as well as subsequent communication regarding policies and scientific findings. Timely assessments will include clinical evaluations and re-evaluations in healthcare settings, appropriate follow-up conducted by public health professionals, and longitudinal assessments of the impact of environmental exposure on children's and adults' health (including among pregnant women).

- R-8. Re-establish the Michigan Childhood Lead Poisoning Prevention and Control Commission.

The Commission would perform a comprehensive review of the state's lead poisoning prevention program; evaluate the effectiveness of the program, including its ability to satisfy federal law requiring that 100 percent of all young children enrolled in Medicaid be screened with a blood lead test; and make recommendations for the program's improvement. The Commission would also conduct public hearings, review information from other sources, and study other states' experiences. The Commission must also develop short- and long-range strategic recommendations for childhood lead poisoning prevention and control in Michigan.

- R-9. Ensure that MDHHS is transparent and timely in reporting and analysis of aggregate data regarding children's blood lead levels. MDHHS data regarding lead levels shall be provided

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to individuals and organizations, based on their expertise, upon request and in cases when the interpretation of data by MDHHS is questioned.

- R-10. Establish a more aggressive approach to timely clinical and public health follow-up for all children known to have elevated blood lead levels, statewide. MDHHS should expand its local efforts and partnerships to accomplish this goal. Whenever possible, routine screening for lead and appropriate follow-up should occur in children's primary care medical homes.
- R-11. Strive to be a national leader in monitoring and responding to exposure of children to lead by converting the Childhood Lead Poisoning Prevention Program (CLPPP) from passive collection of test results into an active surveillance and outreach program.
- Performance of the surveillance program should be reported to the public. MDHHS should be prepared to amplify its efforts if performance targets are not met.
- R-12. Improve screening rates for lead among young children through partnerships with county health departments, health insurers, hospitals, and healthcare professionals.
- R-13. As the state authority on public health, and as the organization that conducted the epidemiologic study of Legionellosis cases in Genesee County in 2014-15, take responsibility for coordinating with GCHD and CDC to protect Michigan residents from further outbreaks of Legionellosis.<sup>43</sup>
- R-14. In cases of switches in drinking water supplies in the future, the state must assume that outbreaks of cases of Legionellosis may be related to changes in water source and should communicate the potential risk to the public, rather than assuming and communicating the opposite.

## Michigan Governor's Office

### *Defined Role*

The Governor of Michigan heads the executive branch of Michigan state government and has the power to reorganize state departments and appoint department heads. All executive branch departments of state government report to the Governor, including the three key departments involved in the Flint water crisis: MDEQ, MDHHS, and Treasury. The Governor also appoints personal staff to keep him informed of issues and events. Among other responsibilities, the Governor (through the Michigan Department of Technology, Management and Budget) submits an annual budget and has a line-item veto for appropriations bills.

Rick Snyder, Michigan's 48th Governor, took office in January 2011. He began his second term in January 2015.

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<sup>43</sup> Specific steps should include: (a) anticipate the risks of Legionellosis infections going forward; (b) take timely steps to minimize those risks in Flint drinking water by working with EPA, MDEQ and Flint WTP; (c) coordinate with healthcare facilities to minimize risks of healthcare facility-acquired Legionellosis; (d) communicate with the public about steps being taken and cases of Legionellosis that occur.

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## Discussion

The Flint water crisis occurred during Governor Snyder's tenure. The Governor and his office were directly involved in *some* aspects of the crisis and briefed on *some* of the major decisions surrounding Flint drinking water. Emergency managers that he appointed made key decisions that led to and prolonged the crisis. He appointed the directors of the three state departments—MDEQ, MDHHS, and Treasury—that bear differing degrees of responsibility for what happened.

The Governor and the Governor's office must rely heavily on information from state departments to make decisions, set directions, and take action. In this case, the individuals and departments on which the Governor relied for guidance provided wrong information, particularly on the issues related to lead in the drinking water and elevated blood lead levels in children. In particular, two state agencies attempted to dismiss and discredit credible evidence of threats to public health. MDEQ did not acknowledge the true extent of the Flint water problems until late September 2015. Likewise, MDHHS, which misread its own data on children's blood lead levels in Flint, did not inform the Governor of lead poisoning related to use of the Flint River as a water source until late September 2015.

However, Governor Snyder and certain executive staff members were aware before late September 2015 of several issues that are noteworthy and relevant. For example:

- The Department of Treasury approved the Flint emergency manager's decisions (supported by Flint City Council) to switch to KWA after negotiations across two entities under emergency management failed. Members of the Governor's staff—and the Governor himself—participated in some of those discussions.
- The Governor's office received citizen complaints and was well aware of numerous press stories about water quality problems as early as May 2014 and continuing throughout 2015.<sup>44,45</sup>
- The decision by General Motors (GM) in October of 2014 to use Flint Township water instead of Flint WTP-sourced water for its Flint Engine Operations facility was not only known to executive staff members of the Governor, but was also cited as a reason to switch back to DWSD (see below).
- In late January 2015, at least one member of the Governor's office was informed that concerns were being raised in the MDEQ about the Legionellosis outbreak in Genesee County and *possible* connection to the Flint water supply.<sup>46</sup>
- In March 2015, at least one of the Governor's office staff members was advised of the Legionellosis outbreak in Flint and local health department concerns of a potential link to the Flint water conversion.<sup>47</sup>

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<sup>44</sup> This was subsequent to Department of Treasury's approval of the Flint emergency manager's decision to contract with LAN to upgrade the Flint WTP to treat water from the Flint River as the primary drinking water supply, instead of purchasing water from DWSD.

<sup>45</sup> The October 1, 2014 MDEQ briefing paper to Governor's office regarding City of Flint drinking water situation (boil water notices) ascribes problems to aged, inadequately maintained, cast iron pipe in the distribution system.

<sup>46</sup> See January 30, 2015 e-mail from Brad Wurfel/MDEQ to Dave Murray, Governor Snyder's deputy press secretary, re: *Legionella*.

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- In March 2015, the Governor's chief of staff proposed buying and distributing bottled water in Flint because of citizen concerns about water quality.
  - In mid-summer 2015, an aide to Governor Snyder arranged for the donations of water filters to be distributed in Flint to address concerns about water quality.
  - In mid-summer 2015, the Governor and senior staff discussed Flint water issues; lead was apparently part of those discussions.

The switch to the Flint River as the primary source of drinking water for the City of Flint occurred in late April 2014. On October 14, 2014, after citizen complaints about the water's odor, color and taste<sup>48</sup> and the decision by GM to leave the Flint water system, two key executive staff members traded emails suggesting that, given these problems, it was time to switch back to DWSD for Flint's drinking water. Other executive staff members received these emails, and—according to the Governor's chief of staff at the time—the Governor was informed of the concern and the suggestion. A phone conversation occurred between key staff members Valerie Brader and Rich Baird and the Flint emergency manager about the suggestion. The emergency manager assured these Governor's office staff members that the water quality problems were not of a permanent nature and asserted that it would be too costly to switch back to DWSD. That conversation ended any serious discussion about switching back to DWSD at that time.

The suggestion to switch back to DWSD was revisited in mid-summer 2015. However, MDEQ continued to provide reassurances that the treated water reaching homes in Flint was both safe and in compliance with SDWA requirements. These continuing reassurances, as well as the cost issue, apparently prevented any systemic or comprehensive review of the water situation in Flint.

According to Governor Snyder, it was not until after September 28, 2015, that he was personally advised that MDEQ and MDHHS had been wrong for months about the reality of lead in the water and children's blood lead levels.

Discussions about the Flint water situation were also conducted in the context of overarching discussions about financially distressed cities served by emergency managers, and Flint in particular. Flint water issues were a focal point for senior staff and were discussed with the Governor. Considerable frustration was apparent due to new issues arising just as immediate problems seemed on the road to improvement. Continued reliance on MDEQ drove poor decisions—or the lack of decisions.

As the Flint water crisis unfolded, certain state agencies' perceived need to defend the original decision to switch to the Flint River and resist a return to DWSD resulted in public relations and communications efforts that have, at times, been inappropriate. In the spring and summer of 2015, for example, this perceived need to defend a flawed decision manifested itself in attempts by MDEQ and MDHHS to discredit accurate information on lead in drinking water and elevated blood lead levels provided by outside experts. Citizen concerns were at times derided and dismissed, in spite of the fact that various members of the Governor's staff had expressed—and were expressing—concerns about the water situation in Flint at the same time.

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<sup>47</sup> See March 13, 2015 E-mail from Brad Wurfel/MDEQ to Harvey Hollins/Governor's office.

<sup>48</sup> Though not, at that time, related to lead or TTHMs.

To some extent, inappropriate official public relations efforts continue to this day. Even as the state is aggressively engaged in mitigation efforts in Flint, the statement that the Flint water crisis was a local, state, and federal failure implies that blame is attributable equally to all three levels of government. Primary responsibility for the water contamination in Flint lies with MDEQ. In addition, at the time of the water crisis, Flint was under the control of state-appointed emergency managers, who made key decisions that contributed to the crisis. Because of these two facts, the state is fundamentally accountable for what happened in Flint.

Though delayed, we acknowledge and support the many steps the Governor has taken to date to address the implications of lead in the Flint water supply—the state declaration of emergency, the establishment of both the Flint Water Inter-Agency Coordinating Council and Mission Flint, additional funding for addressing the health issues faced by lead-poisoned children in Flint, partial reimbursement for water bills paid during the time of lead contamination, and progress on a plan to replace LSLs.

### **Findings**

- F-12. Ultimate accountability for Michigan executive branch decisions rests with the Governor.
- F-13. The Governor's knowledge, and that of Governor's office staff, of various aspects of the Flint water crisis was compromised by the information—much of it wrong—provided by MDEQ and MDHHS.
- F-14. The Governor's office continued to rely on incorrect information provided by these departments despite mounting evidence from outside experts and months of citizens' complaints throughout the Flint water crisis, only changing course in early October 2015 when MDEQ and MDHHS finally acknowledged the extent of the problem of lead in the public water supply.
- F-15. The suggestion made by members of the Governor's executive staff in October 2014 to switch back to DWSD should have resulted, at a minimum, in a full and comprehensive review of the water situation in Flint, similar to that which accompanied the earlier decision to switch to KWA. It was disregarded, however, because of cost considerations and repeated assurances that the water was safe. The need to switch back to DWSD became even more apparent as water quality and safety issues continued and lead issues began to surface in 2015, notwithstanding reassurances by MDEQ.
- F-16. The Flint water crisis highlights the risks of over-reliance—in fact, almost exclusive reliance—on a few staff in one or two departments for information on which key decisions are based.
- F-17. Official state public statements and communications about the Flint water situation have at times been inappropriate and unacceptable.

### **Recommendations**

- R-15. Expand information flow to the Governor so that information providing the foundation for key decisions comes from more than one trusted source—and is verified.
- R-16. Create a culture in state government that is not defensive about concerns and evidence that contradicts official positions, but rather is receptive and open-minded toward that

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information. View informed opinions—even if critical of state government—as an opportunity for re-assessing state positions, rather than as a threat.

- R-17. Ensure that communications from all state agencies are respectful, even in the face of criticism, and sensitive to the concerns of diverse populations.
- R-18. The Governor must assume the leadership of, and hold state departments accountable for, long-term implementation of the recommendations in this report, including but not limited to the need for cultural changes across multiple state agencies, the need for health mitigation and LSL replacement in Flint, and the need for a funding strategy to address replacement of LSLs statewide.
- R-19. Review budget requests for MDEQ to ensure adequate funding is provided to the ODWMA. EPA audit and interviews indicate that Michigan’s drinking water program might have one of the lowest levels of financial support within EPA Region V while having one of the largest, if not the largest, number of community water systems to regulate.

## State-Appointed Emergency Managers

### *Defined Role*

The role of the emergency manager (EM) under the Emergency Manager Law, PA 436, is clear and unambiguous. Though they report directly to the Department of Treasury, EMs have complete authority and control over municipal decisions. In that context, the EMs had the responsibility to ensure that Flint water system operations were adequately resourced and supported by personnel and consultants with adequate training and expertise.

### *Discussion*

Owing to significant declines in economic vitality and substantial outmigration since (at least) the 1990s, Flint was first placed in financial receivership under an emergency “financial” manager between 2002 and 2004.<sup>49</sup> Since 2011, the City has been under some form of state-ordered and controlled emergency financial management.<sup>50</sup> During this time, four different EMs have served for varying lengths of time, one serving twice.<sup>51</sup>

Our interviews confirmed the EMs reported to and interacted regularly with Treasury officials. They discussed issues such as public safety, staffing requirements, and financial matters. The EMs, working through Treasury, also would contact other state agencies for assistance on a regular basis, such as the State Police on law enforcement matters.

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<sup>49</sup> Imposed under PA 72 of 1990.

<sup>50</sup> In 2011, PA 72 was replaced by PA 4, which amplified the powers of an appointed EM. The voters repealed PA 4 in November 2012, but a subsequent statute was passed by the legislature in December 2012: PA 436 of 2012. That statute is not subject to a voter referendum and has been in effect since March 2013.

<sup>51</sup> Ed Kurtz served as Flint’s emergency financial manager under PA 72 of 1990 from May 2002 to 2004; Michael Brown was appointed in December 2011 under PA 4; Ed Kurtz became EM again in August 2012; Michael Brown was reappointed again in June 2013; Darnell Earley replaced Brown in October 2013; Jerry Ambrose replaced Earley in January 2015; and Ambrose left in April 2015 when control over the city’s finances was assigned to a city administrator under the supervision of a Receivership Transition Advisory Board.

Numerous decisions were made between December 2011 and April 2015 that had some impact on the decision to use the Flint River as the primary source of drinking water for the City of Flint. Various state-appointed EMs served during this timeframe and it was these EMs who made these decisions, **not locally elected officials**. Although it is true that some locally elected officials supported, acknowledged, embraced, and even celebrated some of the decisions, the decisions were not theirs to make. The state-appointed EMs made the decisions.

Specifically, Flint EM Ed Kurtz authorized use of the Flint River as a water source for Flint, as clearly indicated by his approval of a sole-source contract for the engineering firm Lockwood, Andrews, & Newnam (LAN) to prepare the Flint WTP for full-time treatment of Flint River water. Darnell Earley was the incumbent Flint EM and presided over the switch of water sources in April 2014. He and later EM Jerry Ambrose were in place during periods when citizens requested a return to DWSD because of health problems they were experiencing. Neither Darnell Earley nor Jerry Ambrose seriously considered a return to DWSD in part because MDEQ, local staff and their consultants assured the EMs that the water quality problems were manageable and that there was nothing seriously wrong with the water.<sup>52</sup> In March 2015, nearly one year after the source water conversion, Jerry Ambrose stated that a reconnection to DWSD would cost the City \$10.1 million per year and that water purchases could be as high as \$1 million per month—essentially asserting that it was unaffordable.<sup>53</sup>

In any event, the facts in this case point to the reality that state government, as the entity in charge of Flint decision-making, failed to protect the health of the city's residents. Regardless of any successes of the EM process in other Michigan cities, this failure must force us to review the EM law and the general approach to financial problems. Government approaches to cities in fiscal distress must balance fiscal responsibility with the equally important need to address quality of life, economic development, and infrastructure maintenance and provision.

## Findings

F-18. Emergency managers, not locally elected officials, made the decision to switch to the Flint River as Flint's primary water supply source.

F-19. Treasury officials, through the terms of the local emergency financial assistance loan executed by the Flint emergency manager on April 29, 2015, effectively precluded a return to DWSD water, as Flint citizens and local officials were demanding, without prior state approval.

The Emergency Manager Law is predicated on the provision that any ongoing accumulated local government deficit is resolved prior to the termination of receivership (P.A. 436 of 2012). As the city of Flint neared the end of its Emergency Manager status in March 2015, the city still retained an \$8 million accumulated deficit in the General Fund. To resolve this accumulated deficit, the state and the Flint EM, with the concurrence of Flint's City Council, signed an emergency loan agreement between the City of Flint and

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<sup>52</sup> See, for example, "City of Flint Water System Update with Questions and Answers," February 16, 2015, posted to City of Flint website at [www.cityofflint.com/wp-content/uploads/Water-System-FAQ-Update-2-16-151.pdf](http://www.cityofflint.com/wp-content/uploads/Water-System-FAQ-Update-2-16-151.pdf), as confirmed in FWATF interviews of Flint's former EMs.

<sup>53</sup> Memorandum dated March 3, 2015, to Deputy State Treasurer Wayne Workman.

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Michigan’s Local Emergency Financial Assistance Loan Board for nearly \$8 million.<sup>54</sup> This emergency loan included a provision that the City of Flint could not, without prior state approval, return to DWSD or lower water rates.

- F-20. The role of the EMs in Flint (in combination with MDEQ’s failures) places primary accountability for what happened with state government.

Trying to assign responsibility to an individual EM for the decision to use the Flint River is pointless—and the answer ambiguous. One EM set it in motion, another presided over the actual event, and two EMs did not seriously entertain reversing the decision in the face of public protest. The latter refusals were for simple reasons: they received “expert” advice that the water was safe to drink, and they concluded that switching back to DWSD would be too costly.

We believe the larger issue is one of accountability. Who is accountable for the decisions made by the EMs in Flint? We believe the state must assume that accountability. If the state does not assume that responsibility, given the role the state has in both the appointment of EMs and the line of accountability to the Department of Treasury, then no accountability exists at all.

- F-21. EMs charged with financial reform often do not have, nor are they supported by, the necessary expertise to manage non-financial aspects of municipal government.

- F-22. Michigan’s Emergency Manager Law and related practices can be improved to better ensure that protection of public health and safety is not compromised in the name of financial urgency.

The EM Law is predicated on the concept that a local financial crisis—such as that which occurred in Flint in 2011—is due to the inability of local officials to address the problem. The EM is supposed to be able to better handle the situation, make better and faster decisions, and resolve the crisis. The EM law states “[t]hat the fiscal stability of local governments is necessary to the health, safety, and welfare of the citizens of this state and it is a valid public purpose for this state to assist a local government in a condition of financial emergency.”<sup>55</sup> The EM is deemed necessary not only to resolve the fiscal problem but also to protect the public health and safety.

Yet in the case of Flint, while other state and local officials were involved, EMs were at the heart of decision-making processes that prolonged lead exposure occasioned by MDEQ’s failure to prescribe appropriate treatment for the Flint water system.

## **Recommendations**

- R-20. Review Michigan’s Emergency Manager Law (PA 436) and its implementation, and identify measures to compensate for the loss of the checks and balances that are provided by representative government.

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<sup>54</sup> Note that the Resolution presented to Flint City Council by the Flint EM, Resolution 150302.1, contained no information regarding the DWSD and water rates conditions contained in the emergency loan.

<sup>55</sup> Michigan Public Act 436 of 2012, Section 3 (c).

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Although we acknowledge that controversy will always accompany state receivership in whatever form, we recommend a review of PA 436. While some of the checks and balances inherent in democratic decision-making are necessarily and by definition absent under emergency management—as is also true under bankruptcy—proper and efficient checks and balances per se should not be a casualty of state receivership. Neither should avenues for citizens to voice their concerns, particularly regarding matters of public health and safety.

R-21. Consider alternatives to the current EM approach—for example, a structured way to engage locally elected officials on key decisions; an Ombudsman function in state government to ensure that local concerns are a factor in decisions made by the EM; and/or a means of appealing EM decisions to another body.

R-22. Ensure proper support and expertise for EMs to effectively manage the many governmental functions of a city. Decisions on matters potentially affecting public health and safety, for example, should be informed by subject matter experts identified and/or provided by the state.

EMs are asked to ensure the protection of the public health and safety and yet are not provided adequate tools and resources to achieve this objective. EMs are empowered to effect cost-cutting measures such as the ability to terminate contracts and restructure budgets. However, they are given little or no priority access to state or federal resources or assistance in undertaking the complex activities of running a municipality. Other states take different approaches that may do a better job of balancing the need for fiscal discipline with the need to provide basic public services, especially when scientific, health, and/or engineering expertise is involved.

## City of Flint

### *Defined Role*

As the owner of its public water system, the City of Flint has responsibility for compliance with the SDWA under Act 399. These responsibilities include “ensuring proper design, construction, operations and maintenance, so that contaminants in tap water do not exceed the standards established by law.” The City is “required to employ properly certified water operators that are trained and experienced to operate the treatment and distribution system.”

The City must “test its water routinely for specified contaminants and report the results to MDEQ.” If a water system is not meeting these standards, it is the water supplier’s responsibility to notify its customers when there is a problem with water quality.<sup>56</sup> With a planned change in water source, it is the City’s responsibility to carefully plan and test water treatment techniques, ensure staff is knowledgeable about treatment protocols, and monitor distribution system water quality. We note that decisions affecting these responsibilities, particularly those that had financial implications, were ceded to Flint’s EMs throughout the course of the Flint water crisis.

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<sup>56</sup> Quotes are from the MDEQ’s “Outline of Flint Drinking Water Issues for Flint Water Task Force,” p.3.

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## Discussion

City of Flint Public Works executive leadership and staff were immediately responsible for treating Flint River water and for monitoring water quality in the distribution system. SDWA compliance is the obligation of the public water supplier, and it is their hands that public trust is placed. Flint was responsible for ensuring that its WTP was adequately upgraded and tested to perform full-time operations, that operations staff members were adequately trained and familiar with treatment processes, that the treatment technologies used were adequate to produce safe drinking water, and that the water quality throughout the distribution system (all the way to consumers' taps, in the case of the LCR) was in compliance with regulatory requirements, as confirmed using appropriate sampling procedures. These standards of practice were not met in Flint.

The City relied on Flint Utilities Department staff's limited experience, consultant advice, and most substantially MDEQ for technical support. In this respect, Flint was similar to many communities in Michigan that rely on MDEQ for technical assistance and advice on regulatory compliance requirements. However, in Flint, that reliance was tragically misplaced.

Our interviews underscored several troubling aspects of the inexorable drive to leave the DWSD system and use the Flint River as an interim supply source for drinking water. Most obviously, the parties simply failed to adequately appreciate (or signal) the complexities involved in treating Flint River water, or the potential implications of water chemistry changes to the city's water distribution network. We note that Flint endured a series of water quality threats—from *E coli* contamination to high total trihalomethane (TTHM) levels—that could have been prevented. Increased lead exposure and increased incidences of Legionellosis likely are the most serious health consequences of a sustained period of water quality problems that clearly overwhelmed Flint staff. At best, consultant support for Flint River water treatment, and later for redress of distribution system water quality problems, focused on specific issues without adequate consideration for latent public health dangers.

The Flint Utilities Department personnel were under-trained, inexperienced with full-time plant operations, and ill-prepared to manage complex water chemistry issues. We note that selected staff members conveyed concerns as events unfolded, only to have those concerns discounted. Several aspects of the situation are particularly troubling.

- Less than one month before startup of full-time Flint WTP operation, MDEQ was uncertain about its requirements for the transition. MDEQ staff noted internally that Flint would face complexities in treating Flint River water and challenges with full-time operation of the dated WTP.<sup>57</sup>
- It is not clear that Flint's resident consulting engineers, LAN, had adequate expertise and experience with river water treatment, yet the firm was engaged through a sole-source contract.<sup>58</sup>

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<sup>57</sup> See, for example, Stephen Busch e-mail of March 26, 2014 – and his e-mail of exactly one year earlier.

<sup>58</sup> LAN representatives were not made available for interview. Questions were provided in writing and sent to LAN (and are included in Appendix IV); responses were not received prior to publication of this report.

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- Flint WTP operators were hired too late in plant ramp-up efforts to enable full-time staffing, which precluded adequate training on plant operations.
  - MDEQ misinterpreted the Lead and Copper Rule (LCR) in determining that corrosion control treatment was not necessary with commencement of full-time WTP operation. Neither Flint Utilities Department staff nor their consulting engineers were given either to question this misinterpretation, or to institute rigorous distribution system water quality monitoring to safeguard against corrosion-causing water quality issues.

We note that Flint WTP supervisory personnel's expressed concerns regarding readiness to begin full time operations—including appropriate LCR-mandated sampling—and these concerns went unheeded.<sup>59</sup> However, it seems clear that these concerns were voiced in an environment that was unreceptive to reconsideration of the City's chosen course, mandated by its EMs.<sup>60</sup>

We also are dismayed by the inadequate and technically flawed efforts Flint Utilities Department personnel undertook, based on MDEQ's instructions, to assess distribution system water quality. As a result, Flint's water quality sampling was fundamentally flawed, giving false assurances and an untenable basis for MDEQ's claims that Flint's system was delivering safe water. The series of missteps and outright errors is well documented,<sup>61</sup> including sampling of pre-flushed lines, use of narrow-mouthed bottles, and perhaps most egregiously failure to select high-risk homes for testing, as required by the LCR. It is hard not to attribute this conduct to a misguided objective of securing nominal LCR compliance irrespective of what conditions might actually exist in the homes of Flint residents.

Also troubling, though not altogether uncommon among U.S. water systems, is Flint's admission that it had not conducted a census of LSLs as required by the LCR. Without this information, Flint was not in a position to identify high-risk homes to properly monitor lead levels and comply with the LCR.

In summary, while we cannot begin to explain or excuse MDEQ's transgressions in its oversight of the conversion to the Flint River water supply, the Flint Public Works role in the crisis appears attributable to an inexperienced and poorly resourced organization struggling to take on enormous, untenable responsibilities. Flint's EM, relying on sole-sourced consultant support, held responsibility for ensuring adequate staffing, training, and preparation for conversion of Flint's drinking water source. Those responsibilities were not met.

## **Findings**

F-23. Flint Public Works personnel were ill-prepared to assume responsibility for full-time operation of the Flint WTP and distribution system.

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<sup>59</sup> April 17, 2014 e-mail from Flint Utilities Department's Michael Glasgow to Adam Rosenthal, Mike Prysby, and Stephen Busch at MDEQ.

<sup>60</sup> See, for example, April 24, 2014 e-mail from Daugherty Johnson, City of Flint Utilities Administrator, and Mike Prysby and Stephen Busch/MDEQ, including Flint Public Works Director Howard Croft.

<sup>61</sup> See, for example, "COMMENTARY: MDEQ Mistakes and Deception Created the Flint Water Crisis," September 30, 2015, Siddhartha Roy, Flintwaterstudy.org, and February 27, 2015 e-mail from Miguel Del Toral/EPA to MDEQ: "If systems are pre-flushing the tap the night before collection of LCR compliance samples (MDEQ still provides these instructions to public water systems) this clears particulate lead out of the plumbing and biases the results low by eliminating the highest lead values."

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- F-24. The Flint WTP and installed treatment technologies were not adequate to produce safe, clean drinking water at startup of full-time operations. Flint's lack of reinvestment in its water distribution system contributed to the drinking water crisis and ability to respond to water quality problems.
- F-25. Flint Public Works personnel failed to comply with LCR requirements, including the use of optimized corrosion control treatment and monitoring for lead. Flint personnel did not identify residences with LSLs, secure an adequate number of tap water samples from high-risk homes, or use prescribed sampling practices (for example, line and tap flushing methods and sample bottle sizes).
- F-26. Flint Public Works acted on inaccurate and improper guidance from MDEQ.
- F-27. Many communities similarly rely on MDEQ to provide technical assistance and guidance on how to meet regulatory requirements. In the case of Flint, MDEQ assistance was deeply flawed and lax, which led to myopic enforcement of regulations designed to protect public health.
- F-28. The EM structure made it extremely difficult for Flint citizens to alter or check decision-making on preparations for use of Flint River water, or to receive responses to concerns about subsequent water quality issues.

## Recommendations

- R-23. Establish and fund a team of subject matter experts in water system operations (treatment and distribution system management) to support and train water system personnel, guide safe system operation under current conditions, and prepare for successful conversion to KWA.

In addition to creating water quality problems, the switch to the Flint River may have precipitated conditions in Flint's water system that increase the potential for *Legionella* to occur. With warmer temperatures in 2016, there is a heightened need for multi-agency coordination on testing of the Flint water system for the presence of *Legionella*, and on public health monitoring for the incidence of Legionellosis and determinations of sources.

- R-24. Implement a programmatic approach to Flint WTP and distribution system operations, maintenance, asset management, water quality, capital improvements and public engagement (including risk communication) to ensure that the disparate ongoing efforts to address Flint water system infrastructure needs are coordinated, fully documented, and structured to sustain high-quality potable water service over the long term.

Though not the subject of the FWATF's review, it is apparent that the Flint water utility faces acute financial challenges due to earlier financial management practices, as well as successful challenges to EM-ordered rate increases. These circumstances impose an unprecedented context for establishing defensible water rates and collection practices in a community that was already facing difficult water affordability challenges. Careful financial planning and management will be required to secure and effectively deploy external funding assistance, and to gradually stabilize water system revenues to sustain water utility operations over the long term. This must be complemented by an effective public education and engagement program, and innovative water affordability strategies to advance universal access to potable water service.

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R-25. Implement a robust public engagement and involvement program in conjunction with the anticipated conversion to KWA-delivered water and provide for regular reporting to the Flint Water Inter-Agency Coordinating Committee (FWICC).

## Genesee County Health Department (GCHD)

### *Defined Role*

As a local health department, the Genesee County Health Department (GCHD) is responsible for all government public health functions for residents in their jurisdiction, including the City of Flint. Like the vast majority of cities in Michigan, Flint does not have its own public health officials and instead relies on its county health department (GCHD) to perform public health functions. GCHD must coordinate and communicate effectively with city officials and the public. Specific to the Flint water crisis, GCHD responsibilities include investigating outbreaks of reportable diseases such as Legionellosis and conducting timely in-home assessments of potential sources of lead exposure for children found to have elevated blood lead levels.

Importantly, the functions of local health departments also include cooperative coordination with state public health authorities (MDHHS), and in turn with federal public health authorities (for example, Centers for Disease Control and Prevention [CDC]) as needed. The expectation is that local health departments manage issues that arise in their jurisdictions. State public health authorities become involved at the request of local authorities and/or when events such as an outbreak involve more than one jurisdiction (that is, more than one local health department). In turn, MDHHS requests help from the CDC as needed. This local-to-state-to-federal sequence is designed to facilitate communication, coordination, and follow-up among officials at multiple levels of authority, and it requires mutual trust, collaboration and effective communications across agencies.

### *Discussion*

In summer 2014, after the change of water source for the City of Flint, there were two public health problems that arose within the jurisdiction of GCHD: exposure to lead and exposure to *Legionella*.

#### **Exposure to Lead**

In contrast to Legionellosis, which has involved GCHD as a front-line responder, GCHD was not extensively involved in responding to exposure of children to lead from the Flint water supply. Elevated blood lead level records are maintained as part of a regularly updated listing of test results by MDHHS in the statewide Childhood Lead Poisoning Prevention Program (CLPPP). GCHD was involved as a coordinating organization for conducting tests and relaying test results to the state.

Clinicians are responsible for testing children's blood for lead in early childhood on a routine basis. Health insurance plans (especially those that contract with state Medicaid) are responsible for encouraging families and clinicians to have children screened at the appropriate ages and then following up with children whose blood lead levels are elevated. GCHD would get involved for children with elevated lead levels that prompted in-home assessments of possible sources of environmental lead exposure.

Since the switch to the Flint River, a higher proportion of children in Flint have had elevated lead levels that would prompt in-home assessments. Several aspects of the GCHD-MDHHS response are noteworthy:

- GCHD was overwhelmed with the need for in-home assessments, and MDHHS supported training and placement of outreach nurses in GCHD to supplement its workforce.
- GCHD had been asked only to reach out to pregnant women who might have had lead exposure, rather than performing their usual in-home assessment duties. MDHHS tasked an outside firm with performing the in-home assessments.
- As of late January 2016, only about one-fifth of children known to have had elevated blood lead levels in Flint since April 2014 had received in-home environmental assessments (including water testing).

### **Legionella**

After the switch to the Flint River in 2014, the Flint Utilities Department began flushing water mains citywide to address brown-colored water resulting from corrosion of pipes in the distribution system. Many fire hydrants ran for days, which may have disrupted the “biofilm,” a slime coating (which is distinct from the scaling provided by corrosion control treatment) on the inside surface of the water mains and water service lines. When the biofilm was disrupted, *Legionella* and other bacteria may have been released. In addition, EPA experts Del Toral and Lytle believe that corroding pipes likely absorbed chlorine in the water, leading to extremely low chlorine levels that were insufficient to kill *Legionella* in the water. Also, given the small population in Flint compared to the large water distribution system developed to serve the city’s larger population in decades past, water likely pooled in the system for excessively long periods, providing an ideal environment for bacterial growth.

As noted above, several cases of Legionellosis occurred in patients who likely were exposed to *Legionella* in healthcare facilities. McLaren Medical Center in Flint responded to the incident by hiring a *Legionella* expert, spending \$300,000 for systems to eliminate the bacteria, and changing practices on their wards to instruct patients not to take showers (because aerosols can spread *Legionella*).

During this timeframe, the City of Flint (Mayor Dayne Walling, EM Jerry Ambrose and others) asserted the water was safe. Even while outbreak investigations were ongoing, GCHD and MDHHS did not issue a bulletin to the medical community or the public. The *Legionella* expert hired by the hospital and other water quality experts cannot dismiss the possibility of a link between the Legionellosis outbreaks and lack of proper corrosion control and disinfection in the City’s water system.

In Flint, neither the Flint EM nor his appointed City Administrator, GCHD, or MDHHS fully disclosed the Legionellosis outbreak to local medical professionals or the general public. Moreover, this outbreak, *which is always associated with water supplies*, was not communicated by MDEQ with sufficient urgency to the Governor’s office.

In contrast, New York City experienced an outbreak of Legionellosis attributed to several hospital cooling systems in different parts of the city in summer 2015. Public health officials made

announcements to City residents about the cases and the outbreak was reported in the media, along with health advice for the public.

### **Findings**

- F-29. Communication, coordination and cooperation between GCHD, the City of Flint and MDHHS were inadequate to protect Flint residents from public health threats resulting from inadequately treated Flint River water.
- F-30. The rate of follow-up on children with elevated blood lead levels through January 2016 was unacceptable, illustrating a low level of coordination between GCHD and MDHHS and insufficient resources devoted to this task.
- F-31. Management of the Flint River-sourced water supply may have contributed to the outbreaks of Legionellosis cases in 2014 and 2015 in Genesee County. Although the definitive cause of the outbreaks is uncertain at the time of publication, GCHD and MDHHS did not notify the public of the outbreaks in a timely fashion in order to urge caution.

### **Recommendations**

- R-26. Improve follow-up on public health concerns between GCHD, MDHHS and the City of Flint now and in the future, to effect timely, comprehensive, and coordinated activity and ensure the best health outcomes for children and adults affected.
- R-27. Presume that the risk of *Legionella* may remain elevated in the Flint water distribution system and must take appropriate steps with public and private partners to monitor and mitigate that risk as concerns about water quality continue in the City of Flint.
- R-28. Coordinate with state officials (MDHHS) and with local healthcare professionals and healthcare institutions in Genesee County and the City of Flint to mitigate the risk of Legionellosis in 2016 and beyond.

It is not clear whether the switch back to DWSD in October 2015 and subsequent addition of corrosion control will change the conditions for *Legionella* growth in the Flint water distribution system. In addition, the strong predominance of cases linked to healthcare exposure at one particular hospital in Flint underscores the critical importance of appropriate and timely antiseptic use by healthcare facilities to reduce the risk of Legionellosis.

To facilitate appropriate collection of *Legionella* specimens that will permit tracing of *Legionella* species in the setting of any further outbreaks, healthcare professionals in Genesee County should be vigilant and err on the side of collecting respiratory specimens before initiating therapy in cases of presumed Legionellosis.

## **U.S. Environmental Protection Agency (EPA) Oversight and the Lead and Copper Rule**

### **Defined Role**

EPA has responsibility under the Safe Drinking Water Act to set and enforce health-based drinking water quality standards. EPA establishes National Primary Drinking Water Regulations that set enforceable maximum contaminant levels in drinking water and prescribe treatment

requirements. Each standard also includes requirements for water systems to test for contaminants in the water to make sure standards are achieved.

EPA regulates public water systems through its Public Water System Supervision (PWSS) program. From the description of that program:

*EPA's and states' primary means of monitoring public water system compliance with the SDWA and its implementing regulations is the review and evaluation of analytical results of water samples collected by public water systems. These reports provide the water systems and regulators with the data they need to ensure that drinking water monitoring is ongoing and that the drinking water standards are being met. When results indicate that a contaminant is present at a level that exceeds standards, states and EPA work with public water systems to take steps to prevent or remove the contaminants, and notify consumers so that they can make informed choices.*<sup>62</sup>

EPA is required to oversee the regulatory actions of state and local agencies and ensure that local public water suppliers adhere to the standards set under the SDWA.<sup>63</sup> The SDWA authorizes the EPA to delegate primary enforcement responsibilities to the states. Forty-nine states, including Michigan, have this delegated authority.

While the states are delegated regulatory primacy, there are two sections of the SDWA that give EPA authorization to act:

- a. Sec. 1414 of the Act says that when the agency finds a public water system out of compliance, the EPA must notify the state and public water system of the violation. If after 30 days the state has not commenced enforcement action, then the EPA must issue an order to comply. In the case of Flint, EPA did not use this authority as required by the SDWA.
- b. Sec. 1431 of the Act grants emergency powers to the EPA when the Administrator is aware of a contaminant or threat “which may present an imminent and substantial endangerment to the health of persons, and that appropriate state and local authorities have not acted to protect the health of such persons, the EPA Administrator may take such actions as he or she may deem necessary in order to protect the health of such persons.” The EPA used this authority when it issued its emergency order on January 21, 2016.

#### **Lead and Copper Rule:**

The Lead and Copper Rule (LCR) is intended to protect public health by reducing lead and copper in drinking water at customers' taps. For the rule to be effective, and for lead and copper contamination to be detected, water sampling practices must be rigorous. Ample industry guidance<sup>64</sup> emphasizes the requirements for this rigor, which include selecting residences at high

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<sup>62</sup> [www.epa.gov/compliance/safe-drinking-water-act-sdwa-compliance-monitoring](http://www.epa.gov/compliance/safe-drinking-water-act-sdwa-compliance-monitoring)

<sup>63</sup> Before the federal EPA was established, states regulated drinking water. The SDWA kept that regulatory structure in place and assigned EPA oversight responsibility for state regulatory activities.

<sup>64</sup> See, for example, “A Field Comparison of Sampling Protocols for Measuring Lead in Drinking Water,” Porter, A., M. Del Toral, and M. Schock. In *Proceedings*, Water Quality Technology Conference, Long Beach, CA, November 3-7, 2013, American Water Works Association, Denver, CO (2013).

risk for lead exposure, prohibiting pre-flushing and aerator removal, and observing minimum stagnation times. More fundamentally, public water systems must identify the LSLs in their service areas, advise customers of their presence and potential implications, and facilitate full service line replacements in the event of action level exceedances. The LCR also requires public water systems to minimize lead and copper levels in drinking water by controlling corrosion in the distribution system, which is achieved by implementing corrosion control treatment (CCT).

Unfortunately, despite the clarity of its intent, the LCR's language has been subject to various interpretations from one state, and one water system, to another. Though MDEQ's misinterpretations may be among the most egregious examples of lax and myopic compliance practices, there are pronounced concerns that the effectiveness of the rule has been compromised.<sup>65</sup> EPA is in the process of reviewing and revising the LCR through its established rulemaking procedures.

While the states are delegated regulatory primacy, 40 CFR 141.82(i) gives the EPA Regional Administrator authority to review treatment decisions made by a state and issue federal treatment determinations consistent with the LCR.

### *Discussion*

Prior to Flint's water supply conversion, EPA's delegation of primacy for enforcement of the SDWA in Michigan had been challenged by a series of disagreements and concerns over compliance requirements and sampling practices.<sup>66</sup> These were heightened with the series of events that precipitated the water crisis. EPA Region V was first notified of a potential problem in Flint by resident LeeAnne Walters, who called to inform them of the high lead level (104 ppb) found in her drinking water. In early 2015, EPA's Miguel Del Toral worked with Walters to diagnose water quality problems at her residence. During this time, EPA inquired (repeatedly) about CCT at the Flint WTP, advised MDEQ that the LCR unambiguously requires CCT, and were told incorrectly that Flint had an optimized corrosion control program.

In this timeframe, EPA was trying to determine whether the high lead levels at LeeAnne Walters's house represented an isolated or system-wide problem. Ultimately, it required LeeAnne Walters's inquiry of Flint Utilities Department personnel for EPA to learn that Flint did not have CCT in place. It took 2 months from EPA's first inquiry for MDEQ to acknowledge that Flint was not implementing CCT.

Given this information, EPA tried to convince MDEQ by persuasion and forthright referencing to the LCR that Flint needed to add CCT (as DWSD had been doing for decades). However, MDEQ was entrenched in its (incorrect) position that two 6-month monitoring periods are allowed before a decision on CCT is required. MDEQ forestalled imposing the requirement for CCT pending issuance of a legal opinion.

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<sup>65</sup> See, for example, Dr. Yanna Lambrinidou's dissenting opinion on long-term revisions for the LCR, submitted to the EPA National Drinking Water Advisory Council in October 2015 ("EPA NDWAC LCR WG, Dissenting Opinion, Oct. 2015"), [www.epa.gov/sites/production/files/2015-11/documents/ndwacldrstatementofdissent.pdf](http://www.epa.gov/sites/production/files/2015-11/documents/ndwacldrstatementofdissent.pdf); and the Northeast-Midwest Institute's Elin Betanzo's article, "Clarifications Needed to Strengthen the Lead and Copper Rule Working Group's Recommendations for Long Term Revisions to the Federal Lead and Copper Rule," November 17, 2015, [www.nemw.org/wp-content/uploads/2015/11/NEMWI-LCR-recommendations.pdf](http://www.nemw.org/wp-content/uploads/2015/11/NEMWI-LCR-recommendations.pdf).

<sup>66</sup> FWATF interviews with Miguel Del Toral. Also see April 27, 2015, e-mail exchanges among MDEQ's Cook, Busch and Prysby regarding Del Toral's question on corrosion control treatment.

EPA was similarly hampered by poor information derived from Flint's flawed water quality sampling for LCR compliance. Not only did MDEQ persist in prescribing sampling methods that limited opportunities for detection of lead contamination, it did not ensure that a proper sample pool was obtained from the Flint system. The first 6-month monitoring period results showed the 90<sup>th</sup> percentile lead level results to be 6 ppb, and the second 6-month monitoring period results showed the 90<sup>th</sup> percentile to be 11 ppb. Both of these outcomes fell beneath the lead action level of 15 ppb. Unfortunately, because of the flawed sampling pool and sampling techniques, the extent of the lead problem was under-reported. It came to light in September 2015 with the results of Dr. Marc Edwards's lead sampling program. After testing 252 water samples taken in Flint, the 90<sup>th</sup> percentile<sup>67</sup> of Dr. Edward's samples was found to be 25 ppb, and more than 100 samples had lead over 5 ppb.

Even given the City's flawed sampling program, EPA staff did become aware of the potential risks in April 2015 when MDEQ's failure to require CCT was revealed, and EPA leadership was advised of acute concerns in an interim report by Miguel del Toral in June 2015:

*"In effect, the City of Flint stopped providing treatment used to mitigate lead and copper levels in the water. In accordance with the Lead and Copper Rule (LCR), all large systems (serving greater than 50,000 persons) are required to install and maintain corrosion control treatment for lead and copper. In the absence of any corrosion control treatment, lead levels in drinking water can be expected to increase.*

*The lack of mitigating treatment is especially concerning as the high lead levels will likely not be reflected in the City of Flint's compliance samples due to the sampling procedures used by the City of Flint for collecting compliance samples."*<sup>68</sup>

However, with the exception of the strident e-mails and interim report by Del Toral,<sup>69</sup> EPA refrained from elevating concerns or taking action. EPA did not insist on implementation of CCT between the end of April 2015, when it learned CCT was not in place, and July 21, 2015, when the second round of LCR monitoring results ended MDEQ's misinformed interpretation of the LCR. Only after broad public revelation of the magnitude of the crisis and of MDEQ's multiple failures—and, not coincidentally, the opportunity to garner positive recognition—did EPA exercise its authority under the SDWA and issue its Emergency Order on January 21, 2016.

EPA did not cause the problem in Flint, and it was EPA employees (in particular Del Toral) who asserted the need for Flint to have CCT in place. Unfortunately, EPA was not insistent or forceful enough to prompt MDEQ to require Flint to add CCT for almost 3 months after EPA was aware of its absence. This needlessly extended the time during which Flint residents were exposed to corrosive drinking water with potentially high levels of lead.

Finally, EPA entertained and acquiesced to MDEQ's request for a legal opinion regarding the long-standing and well-understood requirement for corrosion control, ultimately issuing a clarification memo on LCR compliance requirements that suggested ambiguities.

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<sup>67</sup> For a discussion of the arithmetic related to calculation of the 90<sup>th</sup> percentile, see the YouTube video: "How to calculate Flint's 90th percentile lead level with EMU math professor Chris Gardiner," [www.youtube.com/watch?v=9pqI00zr700&feature=em-share\\_video\\_user](http://www.youtube.com/watch?v=9pqI00zr700&feature=em-share_video_user).

<sup>68</sup> "Interim Report: High Lead Levels in Flint, Michigan," by Miguel del Toral, transmitted to Thomas Poy, Chief, Ground Water and Drinking Water Branch, on June 24, 2015; p. 2.

<sup>69</sup> See, for example, Miguel Del Toral's e-mail to Jennifer Crooks MDEQ dated April 25, 2015.

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## Findings

- F-32. EPA failed to properly exercise its authority prior to January 2016. The agency's conduct casts doubt on its willingness to aggressively pursue enforcement (in the absence of widespread public outrage). EPA could have exercised its powers under Section 1414 and Section 1431 of the SDWA or under the LCR, 40 CFR 141.82(i).
- F-33. Despite the clear intent of the LCR, EPA has accepted differing compliance strategies that have served to mute its effectiveness in detection and mitigation of lead contamination risks. These strategies have been adopted at water systems and primacy agencies across the country. Though there may be some ambiguity in LCR rule, none of it relates to what MDEQ should have done in Flint. There was and remains no justification for MDEQ not requiring corrosion control treatment for the switch of water source to the Flint River.
- F-34. EPA was hesitant and slow to insist on proper corrosion control measures in Flint. MDEQ misinformation notwithstanding, EPA's deference to MDEQ, the state primacy agency, delayed appropriate intervention and remedial measures.
- F-35. EPA tolerated MDEQ's intransigence and issued, on November 3, 2015, a clarification memo on the LCR when no such clarification was needed.

## Recommendations

- R-29. Exercise more vigor, and act more promptly, in addressing compliance violations that endanger public health.
- R-30. In collaboration with the NDWAC and other interested partners, clarify and strengthen the LCR through increased specificity and constraints, particularly requirements related to LCR sampling pools, sample draw protocols, and LSL replacements—and, more generally, strengthen enforcement protocols with agencies delegated primacy.<sup>70</sup>

The LCR should be modified to address a host of issues that have been the subject of ongoing debate and were tragically exemplified by the Flint water crisis. In particular, the LCR should be revised to:

- Unambiguously require optimized corrosion control treatment as a default practice for all large public works systems, and consider extending this requirement to small and medium-sized public water systems.<sup>71</sup> EPA should remove any loopholes or flexible provisions that could be misinterpreted as allowing utilities to defer or avoid corrosion control, as was done in Flint. Optimized corrosion control will continue to be important in the long term, even after LSLs are replaced, due to other sources of lead in the distribution system such as lead solder and brass fixtures.

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<sup>70</sup> For a further discussion of opportunities to strengthen the LCR, see Dr. Yanna Lambrinidou's dissenting opinion on long-term revisions for the LCR, submitted to the EPA National Drinking Water Advisory Council in October 2015 ("EPA NDWAC LCR WG, Dissenting Opinion, Oct. 2015"), [www.epa.gov/sites/production/files/2015-11/documents/ndwaclcrstatementofdissent.pdf](http://www.epa.gov/sites/production/files/2015-11/documents/ndwaclcrstatementofdissent.pdf).

<sup>71</sup> The current LCR language requires corrosion control for small and medium-sized systems only if water testing indicates action level exceedances, and it allows cessation of treatment if subsequent testing is below action levels. EPA should define procedures for small and medium-sized systems to safeguard public health and water quality through evaluation of corrosion control treatment requirements.

- Reiterate (and clarify) lead-in-water tap monitoring and sampling protocols to *ensure* that lead sampling will capture the worst-case lead levels in the highest risk homes, as the LCR intends.
- Clarify requirements for full LSL replacement, avoiding or eliminating language that allows utilities to count a LSL as “replaced” if water from a service line tests under the lead action limit in a one-time sample.
- Ban partial LSL replacements, which have been found by the CDC to increase risks of elevated blood lead levels.

In addition, the 15 ppb lead action level in the LCR should be revisited given that it is widely acknowledged that no lead is safe, and that the CDC recently lowered its 10 micrograms/deciliter “blood lead level of concern” to a 5 micrograms/deciliter “reference level.”

Also, the LCR should call for frequent and accessible public outreach and education on lead-in-water risks, including instructions on steps consumers can take to protect themselves. The LCR should require utilities to provide customers with explicit and urgent public notification of lead risks associated with activities that may cause physical disturbance of LSLs; inform customers when a LSL is present at their home; and provide customers clear information on how to request testing of lead-in-water levels in their homes.

Perhaps most fundamentally, the LCR should mandate proactive, full replacement of LSLs<sup>72</sup> in a manner that appropriately balances risks and financial impacts. The LCR should require LSL replacements to be explicitly incorporated into water utilities’ renewal and replacement programs with required (and monitored) timelines that preclude undue (multi-decade) delays in replacements.

- R-31. Engage Michigan representatives in ongoing LCR revisions and development of enforcement protocols at EPA and MDEQ.

EPA is conducting a process to define revisions to the LCR, which provides an opportunity to clarify ambiguities in requirements and to strengthen measures to protect public health and safety. State and local representatives, chastened by Flint’s experience, should participate in this revision process and ensure lessons learned are clearly and effectively communicated to decision-makers, including the National Drinking Water Advisory Council and EPA.

## Issues Presented by the Flint Water Crisis

While our review has enabled us to draw a number of findings and conclusions about respective roles, it also occasions us to speak to issues and consequences that transcend the accountabilities assigned to individual agencies or entities. These issues convey many of the lessons learned from

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<sup>72</sup> This recommendation is consistent with recommendations of the Lead and Copper Rule Working Group: *Report of the Lead and Copper Rule Working Group To the National Drinking Water Advisory Council, August 24, 2015.* <https://www.epa.gov/sites/production/files/2016-01/documents/ndwaclcrwgfinalreportaug2015.pdf>

the Flint water crisis, evoke collective empathy for the Flint community, and speak to the opportunities for the crisis to improve the conduct and performance of government.

## The Reality of Environmental Injustice

### Discussion

Environmental justice embraces two fundamental principles: (1) the fair, non-discriminatory treatment of all people; and (2) the provision for meaningful public involvement of all people—regardless of race, color, national origin or income—in government decision-making regarding environmental laws, regulations and policies.<sup>73</sup> Environmental justice or injustice, therefore, is not about intent. Rather, it is about process and results—fair treatment, equal protection, and meaningful participation in neutral forums that honor human dignity.

Environmental injustice is not about malevolent intent or deliberate attacks on specific populations, nor does it come in measures that overtly violate civil rights. Environmental injustices as often occur when parties charged with the responsibility to protect public health fail to do so in the context of environmental considerations.

The facts of the Flint water crisis lead us to the inescapable conclusion that this is a case of environmental injustice. Flint residents, who are majority Black or African American and among the most impoverished of any metropolitan area in the United States, did not enjoy the same degree of protection from environmental and health hazards as that provided to other communities. Moreover, by virtue of their being subject to emergency management, Flint residents were not provided equal access to, and meaningful involvement in, the government decision-making process.

The occurrence of environmental injustice in the Flint water crisis does not indict or diminish other public and private efforts to address Flint's many challenging circumstances. However, irrespective of the intent of the parties involved, the simple reality is that the Flint water crisis is a case of environmental injustice.<sup>74</sup>

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<sup>73</sup> From the Environmental Justice Plan for the State of Michigan and Department of Natural Resources and Environment, December 17, 2010:

*"The term 'environmental justice' is defined in Executive Directive No. 2007-23 as follows: Environmental justice means the fair, non-discriminatory treatment and meaningful involvement of Michigan residents regarding the development, implementation, and enforcement of environmental laws, regulations, and policies by this state. The two 'pillars' of environmental justice, thus, are the fair treatment of all people and providing for meaningful public involvement in government decision-making."*

From the U.S. EPA ([www3.epa.gov/environmentaljustice/](http://www3.epa.gov/environmentaljustice/)):

*"Environmental Justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. EPA has this goal for all communities and persons across this Nation. It will be achieved when everyone enjoys the same degree of protection from environmental and health hazards and equal access to the decision-making process to have a healthy environment in which to live, learn, and work."*

<sup>74</sup> There is ample evidence that the lead poisoning crisis is one in a series environmental injustices visited on the citizens of Flint. See, for example, "The Racist Roots of Flint's Water Crisis," by Julia Craven and Tyler Tynes,

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## Findings

F-36. The Flint water crisis is a clear case of environmental injustice.

## Recommendations

R-32. Issue an Executive Order mandating guidance and training on Environmental Justice across all state agencies in Michigan, highlighting the Flint water crisis as an example of environmental injustice. The state should reinvigorate and update implementation of an Environmental Justice Plan for the State of Michigan.

## Perspectives from Flint

The FWATF believes that by characterizing some of the prevailing perspectives of Flint residents, its members can provide valuable context for effectively implementing the recommendations herein.

**From the viewpoint of medical services providers** charged with responsibility to mitigate health consequences, there is both depression and anxiety associated with understanding what is occurring in Flint. The Flint water crisis is a chronic toxic exposure of an entire population in a sharply demarcated geographic area. Several key aspects point to the long-term health and social consequences:

- a. The manifestations of this toxic exposure depend on where along the life course a person may be. At different ages, critical structures and functions are injured or altered to different degrees. These changes may not manifest in functional derangements for months or years after exposure. The science of epigenetics addresses the interaction between genes and the environment, suggesting that some of these changes can be passed on from one generation to the next.
- b. Blood lead levels do not indicate peak lead exposures beyond a 30- to 35-day window. The damage from lead toxicity may be done months before the first blood lead level is taken or after the last is drawn, especially for newborns and children younger than 6 years of age. This suggests that the findings related to elevated lead levels measured in Flint children are merely the tip of the iceberg of actual exposure across children living in Flint.
- c. Documented risks of learning, behavioral, and cognitive problems are present for all potentially exposed children in Flint. Aggressive and impulsive behaviors that can emerge in adolescence related to lead exposure put children in the crosshairs of the criminal justice system, unemployment and underachievement.
- d. The risk of kidney problems, hypertension, gout and stillbirths may affect exposed adults in Flint over the coming years and decades.

**For those serving in Flint's already distressed schools and mental health agencies**, new and unprecedented challenges derive from balancing the need to track children and adults in a toxic exposure registry for preventative and supportive services, while being mindful of the stigma of low expectations for those listed in the registry.

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**For well-intentioned parents,** there is a need for significant sensitivity and expertise as they struggle to address and understand the guilt and depression that derive from unknowingly exposing their children, based on the hollow reassurances of those appointed and elected at city and state levels that the water was safe.

**For non-English-speaking Flint residents,** equally subject to the toxic effects of lead and related psychological trauma, communications and instructions regarding water use were not available, especially for those not literate in their native language. The sight of uniformed state troopers and National Guardsmen entering neighborhoods in convoys with flashing lights frightened many who did not open their doors to accept filter or water distributions. Initial requirements for identification scared many families away from distribution sites. There has been no provision for necessary medical and behavioral services for undocumented residents, regardless of age. There is fear that those presenting for extensive medical services will be deported, potentially dividing families. While there are several organizations that provide services regardless of status, it is essential that trusted members of the community can vouch for those organizations and help with appropriate documents which are unfamiliar to local service providers.

**Among African American seniors,** the protracted Flint water crisis echoes the tragic Tuskegee syphilis study and the decision not to treat smallpox among freedmen in the aftermath of the American Civil War. From this perspective, it is noted that measuring blood lead levels without removing the sources of lead from the environment—in this case, lead-tainted water—appears the equivalent of using Flint's children (and adults) as human bioassays.

**From the perspective of Flint community leaders,** these consequences are traumatic and contribute to a dynamic that requires care and interventions as for any survivors of a traumatic event. These interventions must occur for individuals, neighborhoods and the community. Leaders must work to counter the doubtful views of many residents that public health and political systems do not have the will to sustain primary prevention but, rather, are willing to consign some people by virtue of their home address to the long-lasting neurodevelopmental and health impacts of lead exposure. Flint will have to engage in self-care and healing as it dissects the implications of what has occurred and is reminded of how much further we must go to become a just society.

## Flint Recovery / Remediation

In light of the damage done, and the long-term health, economic, and social consequences for the Flint population, the Flint Water Advisory Task Force endorses the visions of responsive model public health and infrastructure renewal programs outlined by Dr. Mona Hanna-Attisha, Professor Marc Edwards and Miguel Del Toral. Flint's population, exposed to toxic levels of lead, must be provided mitigating health services, public health infrastructure and skilled personnel. Flint's water system, damaged by corrosive water, must be renewed and rehabilitated with high-risk LSL replacements prioritized. The State of Michigan must bear the primary responsibility for funding and securing federal funding for mitigation efforts in light of the responsibilities of state agencies, as well as the fact that state-appointed emergency managers governed Flint as key decisions were made that led to the water crisis.

As our initial letter to Governor Snyder called for a coordinated response to the Flint water crisis, we are gratified to see the efforts, now coordinated through emergency management personnel, to the immediate problems imposed by uncertainty regarding the safety of Flint's tap water.

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## Recommendations

Our final recommendations look beyond the most immediate challenges of the unsustainable and expensive bottled water and filter distribution program that was needed, but clearly must serve as an interim emergency response. We offer the following mid-term and long-term Flint-specific recommendations:

- R-33. Sustainably fund the Flint Water Inter-Agency Coordinating Committee (FWICC) to provide adequate resources to engage supporting sub-committees for delivery of public health and water system services.

The FWICC has been charged with developing an incident action plan; reviewing our recommendations; establishing routine protocols for communications at the local, executive and legislative levels; making recommendations regarding the health impacts of the affected population; and assessing the status of infrastructure and determining feasible actions for upgrading Flint's water system.<sup>75</sup> The FWICC also should ensure transparent, public reporting of the status of various Flint-related measures, including the sources and uses of local, state and federal funds. Charitable organizations should be asked to provide accounting of their Flint-related activities to facilitate comprehensive reporting and information dissemination on available services.

- R-34. Clarify and effectively communicate the roles and work of the City of Flint, Flint Water Inter-Agency Coordinating Council and Mission Flint.

While many of the current efforts and investigations are critically important to safeguard Flint residents, address immediate challenges, and further establish accountability, the FWICC and Mission Flint are now in place to work with the City of Flint in coordinating sustained service delivery and remediation measures. These entities, and accompanying committees and work teams, have complementary roles and responsibilities that should be clearly delineated and communicated to all Flint residents. Communication must include efforts to reach Flint residents for whom English is not the primary language, and residents whose literacy in any language is limited. The status of the projects and programs that these entities are shepherding should be clearly communicated and measured against aspirational goals and objectives.

- R-35. Through collaboration among MDHHS, GCHD, local healthcare professionals, and health insurance plans, ensure 100 percent clinical and environmental follow-up with Flint families whose children have been found to have elevated blood lead levels since April 2014, and work together to ensure that such follow-up occurs in children's medical homes.

For the majority of >200 children residing in Flint and known to have elevated blood lead levels ( $\geq 5$  micrograms per deciliter) from April 2014 to present, appropriate clinical and public health follow-up has not been timely. Such limitations in follow-up reflect a lack of coordination among state and county public health authorities, health insurance plans, local healthcare professionals, and parents. These children, and others who have elevated

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<sup>75</sup> Drawn from January 11, 2016 Press Release: "Gov. Rick Snyder: Flint Water Interagency Coordinating Committee will support long-term needs in Flint."

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blood levels on testing after this report is issued, will need long-term monitoring and access to a support services that include focused public health, nutrition and educational services.

- R-36. Offer all children listed in the recommended Flint Toxic Exposure Registry timely access to age-appropriate screening and clinically indicated follow-up for developmental and behavioral concerns by licensed healthcare professionals, as well as access to early childhood education and nutrition services.

Importantly, all children in the recommended Flint Toxic Exposure Registry are at risk for toxic lead exposure, even if they were not screened for blood lead levels during the time period of April 2014 to present. Therefore, all children listed should have access to the same screening and appropriate follow-up services as children who were found to have elevated blood lead levels.

- R-37. Consider establishing a dedicated subsidiary fund in the Michigan Health Endowment Fund to facilitate funding of health-related services for Flint.

The Michigan Health Endowment Fund (MHEF) statute created eight areas of focus for the fund, including several that are pertinent to the Flint water crisis. The MHEF focuses on access to healthy food (known to offset children's absorption of environmental lead), wellness programs (such as those known to encourage primary and secondary prevention), access to mental health services (such as behavioral therapy for children adversely affected by lead exposure), and foodborne illness prevention (such as averting exposure to lead in food prepared with lead-contaminated drinking water). Given the substantial overlap between the focus areas of the fund and the areas of short- and long-term activity for the people of Flint, it is appropriate to establish a subsidiary fund that would be administered to facilitate funding of health-related services for children and adults in the Flint Toxic Exposure Registry. Because Michigan has been successful in securing federal funds to expand Medicaid coverage for persons under age 21 years in Flint, the subsidiary MHEF Fund would be designed to focus on facilitating and supporting services not explicitly covered by Medicaid. The Fund should also provide funding to support timely and transparent evaluation of the health impact of these supplementary services for the people of Flint.

- R-38. Establish a comprehensive Flint public health program, coordinated with county and state-level public health initiatives, that can serve as a model for population health across the state. This program should provide assessment, interventions, and support not only regarding the health effects of water contamination but also more broadly regarding the health effects of chronic economic hardship and other social determinants of poor health.

## State-Wide Initiatives

Beyond remediation of the impacts inflicted upon Flint, outstanding issues and lessons learned from the Flint water crisis provide an opportunity to improve public water supplies and coordination of institutions charged with safeguarding public health.

### Recommendations

Our recommendations include:

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R-39. Conduct an investigative review of the development and approval of the Karegnondi Water Authority and of the City of Flint's commitments to KWA water purchases.

The development of the KWA and the decision by the City of Flint to join it is complicated by an array of factors related to regional water system capacities, utility capital project contracting and financing, and local control over the implementation of facilities to promote economic development. As noted, issues related to state approval and permitting of the KWA are beyond the scope of our review.<sup>76</sup> However, the specific attributes of the decisions related to KWA warrant investigative review. We note:

- State and local officials repeatedly characterized Genesee County and Flint leadership, including Flint's emergency managers, as adamant in their promotion of KWA and desire for independence from DWSD.
- Several firms, each with ties to the respective and effectively competing parties, issued conflicting studies as to the merit of KWA. Independent review was requested of MDEQ, an agency ill-equipped to render judgments regarding economic feasibility.
- Contracting related to Flint's water purchase commitments and to use of the Flint WTP on an interim basis were effected through action of Flint's emergency managers.

An entity with proper tools and resources, such as the Michigan Attorney General or the U.S. Attorney's office, should do a complete and thorough review of the development and approval of KWA and of the City of Flint's commitments to KWA water purchases.

R-40. Institute a school and daycare water quality testing program (which could serve as a model for the U.S.), administered collaboratively by MDEQ and MDHHS, that includes appropriate sampling and testing for lead contamination for all schools and childcare centers in the state and effective reporting of test results.

Drinking water and water available for food preparation in schools and may be sources of lead and other hazards for school children. Currently, federal and state regulations do not require city, county or state authorities to routinely test water in school buildings. Furthermore, there is no state law, guidance or regulation regarding testing of drinking water in various childcare and pre-school settings (children below kindergarten-age).

Michigan should institute a school and day care water quality testing program, administered collaboratively by MDEQ and MDHHS, that includes appropriate sampling and testing for lead contamination in all schools and childcare centers in the state. Findings from such testing should be made available to all parents of children enrolled in the facilities where testing is performed. If lead is discovered through this testing, immediate remediation of the situation (for example, replacement of LSLs and lead-containing fixtures) must be required.

School testing requirements also should be applied to licensed day care settings across the state, given that young children are at the highest risk of profound health effects from lead exposure.

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<sup>76</sup> These issues may (and perhaps should) prompt general inquiry into how utility regulation may better promote regional optimization of infrastructure investments.

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A “Safe Water in Schools for Health (SWISH) program”<sup>77</sup> would include regular testing (and re-testing) of tap water at school and licensed day-care facility faucets and water fountains for regulated contaminants and for bacteria growth (like *Legionella*) known to be contained in plumbing systems. For schools found to have unsafe water, the program would provide funding and implementation support for either lead pipe replacements or installation of filters capable of treating the water to federal standards. The program could establish goals to install high-quality water fountains that facilitate effective water quality monitoring (as well as student use with refillable bottles). For some schools, this program could include the participation of science programs and students, working with independent testing laboratories. In any event, all water quality testing results should be posted both at the facilities and online, and communicated to parents.

R-41. Develop a model LSL replacement program and funding mechanisms for financing work on private property.

Notwithstanding the water industry’s historical reluctance to advocate for full LSL replacements, the state should develop a funding mechanism and program to evaluate and replace LSLs statewide, recognizing that some communities already have replaced their LSLs.<sup>78</sup> The state should develop a model statewide LSL replacement program that could serve as a national model, in collaboration with EPA, with the following attributes:

- Requirement for developing censuses of LSLs in utility service areas that are accessible on utility systems’ computerized Geographical Information Systems (GIS) and asset management systems. Censuses should be comprehensive, covering full lengths of service lines and ownership status, and be made publicly available to facilitate satisfaction of customer queries.
- Evaluation of lead line conditions and associated risks (placing high priority on replacements of lines to high-risk properties (for example, schools, childcare centers, hospitals, older neighborhoods and residences of vulnerable populations).
- Programming of full LSL replacements in federal- and state-sponsored public housing.
- Provision of health risk information to customers with LSLs when homeowners are presented with the option to pay for the private part of their LSL replacement.
- Explicit incorporation of LSL risk considerations in utility renewal and replacement programs to enable orderly, yet expeditious, full LSL replacement (including replacement of LSLs on private property).
- Establishment or enhancement of funding mechanisms to facilitate full LSL replacements by:
  - Reviewing strategies used by other communities and approaches to addressing funding of improvements on private property;

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<sup>77</sup> These recommendations are drawn from (and reflect our substantive concurrence with) recommendations offered by Peter Gleick, president of the Pacific Institute, and Professor Marc Edwards, Virginia Tech. See “One step to help restore trust in Flint,” *Detroit Free Press*, March 6, 2016.

<sup>78</sup> Information on industry experience and perspectives is provided in “Strategies to Obtain Customer Acceptance of Complete Lead Service Line Replacement,” American Water Works Association, 2005.

- Facilitating public water systems' access to LSL replacement funding, including through provisions in drinking water state revolving loan fund program administration;
- Facilitation of public water system customer funding for replacement of LSLs and lead-containing fixtures on private property;
- Review of LCR-established authority to require full service line replacements; and
- Mitigation of low-income water affordability challenges through financial assistance and innovative financing mechanisms.

The program should provide for MDEQ to require annual reporting and tracking of the census of LSLs as part of regular reporting requirements. MDEQ should compile, analyze and publicly report on the submitted data, enabling state legislature and the general public to readily access information on progress of LSL replacements throughout the state while protecting personal information.

- R-42. Revise and enhance information distributed by public water systems on the implications of widespread use of lead in public and private plumbing.

Independently, or in conjunction with the model LSL replacement program recommended above, the state should improve dissemination of accurate information on the dangers presented by lead in water systems and plumbing. Readily accessible information should be broadly provided about potential sources of high levels of lead in water, including, for example, the potential for the release of lead particulates from piping disturbed by construction activities, as well as lead solder, galvanized plumbing, and brass fixtures. Consider and model successful public engagement (and, more generally, LSL replacement) programs used in countries such as the Netherlands that have more successfully managed lead risks.<sup>79</sup>

- R-43. Use the occasion of the Flint water crisis to prompt local and state re-investment in critical water infrastructure, while providing mechanisms to advance affordability and universal access to water services.

Nationally, water system infrastructure renewal and rehabilitation requirements are expected to exceed \$1 trillion over the next generation.<sup>80</sup> Michigan is no exception in facing a significant infrastructure funding gap, even without prospective funding of full LSL replacements. State and local decision-makers, water utility representatives, and community groups should partner to garner support for water system re-investment (through local service rates and state funding mechanisms), while balancing potential

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<sup>79</sup> Refer to "Water production and distribution in the Netherlands," Andr. Struker, Waternet, Jan Vreeburg, KWR, Jan Peter van der Hoek, Delft University, Waternet, February 2016 – presentation to Flint Water Inter-Agency Coordinating Committee.

<sup>80</sup> See, for example:

- "Report Card for America's Infrastructure," American Society of Civil Engineers (ASCE), 2013, [www.infrastructurereportcard.org/a/#p/grade-sheet/americas-infrastructure-investment-needs](http://www.infrastructurereportcard.org/a/#p/grade-sheet/americas-infrastructure-investment-needs)
- *Buried No Longer: Confronting America's Water Infrastructure Challenge*, AWWA, 2012, [www.awwa.org/Portals/0/files/legreg/documents/BuriedNoLonger.pdf](http://www.awwa.org/Portals/0/files/legreg/documents/BuriedNoLonger.pdf)
- *Drinking Water Infrastructure Needs Survey and Assessment, Fifth Report to Congress*, U.S. EPA, 2011, [www.epa.gov/sites/production/files/2015-07/documents/epa816r13006.pdf](http://www.epa.gov/sites/production/files/2015-07/documents/epa816r13006.pdf)

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impacts on low-income populations. Stakeholders should work to define new and innovative water service pricing and funding approaches<sup>81</sup> to advance water affordability and universal access to service.

- R-44. Prioritize health matters across all state agencies with establishment of a new Cabinet-level post focused on public health.

The Flint water crisis illustrates that MDEQ and MDHHS failed to coordinate and collaborate in responding to multiple health-related concerns raised by members of the Flint community and by public health partners such as GCHD. Governor Snyder indicated that there is no liaison function at the Cabinet level in Michigan state government to connect inter-agency actions regarding health matters. Although the FWICC is designed to function in an inter-agency manner, its purpose is Flint-centric. There is a strong argument that such inter-agency functionality for health should be instituted at the state level, to help safeguard the health of all Michigan residents.

The sheer size of the current MDHHS potentially dilutes the role of the state in important public health matters. The Task Force recommends that a physician or nurse with public health and/or health policy credentials serve on the Governor's Cabinet, and be supported by a staff and budget appropriate for the activities of this role. This person would serve an overall supervisory and inter-agency liaison role for all activities that have a bearing on health for Michiganders. Given the suboptimal health status of the Michigan public on a wide array of matters (for example, infant mortality, obesity, life expectancy, smoking), not to mention the health concerns that are now paramount in Flint, this person would have a broad mandate.

## Conclusions

The conclusion we made in December 2015 that primary responsibility for causing the Flint water crisis rests with the MDEQ has only been substantiated by our subsequent interviews and research. This final report, however, documents the failings, shortcomings and problems in other agencies and entities as well, such as MDHHS, GCHD, the local water treatment plant, the EM structure, the Governor's office, and the U.S. EPA. These failures reflect the discounting of profound public health concerns and indifference to Flint residents' plight.

The value in documenting what went wrong is not to ascribe blame for blame's sake, but to establish the foundation for moving forward, both in Flint and throughout the state. The state clearly must respond with dedicated and systematic attention to health concerns for people of Flint. But it also has the opportunity to demonstrate that lessons have been learned from the Flint experience—as traumatic as it has been and will continue to be—and develop model infrastructure renewal and public health programs that will serve all Michigan residents for generations to come.

Flint residents and their fellow Michigan citizens deserve no less.

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<sup>81</sup> See, for example, "Blue Ribbon Panel on Affordability Final Report," City of Detroit, 2016, [www.detroitmi.gov/brpa](http://www.detroitmi.gov/brpa).

## **APPENDIX I: Flint Water Advisory Task Force (FWATF)**

## Flint Water Advisory Task Force (FWATF)

**Matthew Davis**, MD, MAPP, is professor of pediatrics and internal medicine at the University of Michigan Health System and professor of public policy at the Gerald R. Ford School at the University of Michigan, having joined the faculty in 2000. Davis also is a professor of health management and policy at the School of Public Health. He previously served as the chief medical executive of the Michigan Department of Community Health/Department of Health and Human Services.

**Chris Kolb** (Co-Chair) is president of the Michigan Environmental Council, a statewide coalition of 70 environmental, public health and faith-based nonprofit groups. Before joining the MEC, Kolb represented Ann Arbor in the state House for six years and served six years on the Ann Arbor City Council. He has been president of the MEC for seven years and has more than 12 years of experience in the environmental management field.

**Lawrence Reynolds**, MD, is a pediatrician in Flint who serves as president of the Mott Children's Health Center. He received his medical degree from Howard University College of Medicine and has been in practice for 36 years. He has served as president of the Genesee County Medical Society and the Michigan Chapter of the American Academy of Pediatrics. He has been honored for his humanitarian and advocacy efforts on behalf of children from the Community Foundation of Greater Flint.

**Eric Rothstein** is a national water issues consultant and principal at the Galardi Rothstein Group. He served as an independent advisor on the creation of the Great Lakes Water Authority. Rothstein also has served as Jefferson County, Alabama's rate consultant and municipal adviser for litigation related to the county's bankruptcy and issuance of \$1.7 billion in sewer warrants and led strategic financial planning for the City of Atlanta's Department of Watershed Management. He has more than 30 years of experience in water, wastewater and stormwater utility finance and rate-making assessments.

**Ken Sikkema** (Co-Chair) is a senior policy fellow at Public Sector Consultants, where he specializes in public finance, environment, and energy policy. Prior to joining the firm, Sikkema served in both the Michigan House and Senate, culminating with four years as Senate majority leader. He has also served as both an adjunct and visiting professor at Grand Valley State University.

## **APPENDIX II: FWATF Letters**

December 7, 2015

Dear Governor Snyder:

On Wednesday, November 18, 2015, the Flint Water Advisory Task Force met with representatives of the Michigan Department of Environmental Quality (MDEQ) and the Michigan Department of Health and Human Services (MDHHS) to discuss elements of the 10-point Action Plan designed to address various issues related to the ongoing public health protection challenges precipitated by lead in the Flint water supply. These discussions were held at our request as part of our task to make recommendations to prevent a similar occurrence in Flint or elsewhere, and also to monitor ongoing mitigation efforts.

Subsequent to those meetings, on Tuesday, November 24, 2015, members of the Task Force participated in a conference call with yourself, members of the Administration, and representatives of these agencies to discuss the progress to date on the 10-point Action Plan, as well as several other related issues.

We want to acknowledge the steps that have already been taken to implement the action plan, specifically in the areas of outreach efforts to facilitate blood lead testing for children, communication with health care providers in the Flint community about the importance of testing children for lead, and the training of additional public health nurses in the Genesee County Health Department. We do believe, however, that additional steps need to be taken to reach additional children for blood lead testing, assure proper follow-up with children found to have elevated blood lead levels, and to continue water testing. We will continue to assess state and local efforts and make recommendations regarding specific steps that we believe are warranted.

One primary concern we have at this point is that the current efforts appear to be taking place in the absence of a larger project coordination framework that measures results and clearly delineates responsibilities for continuing actions to protect public health. We believe the state is best positioned to facilitate this larger framework, which should address the following:

1. The need for MDHHS and MDEQ—and, possibly, other state agencies—to set **goals** for actions in collaboration with local and federal agencies and organizations.
2. The need for a set of corresponding **timelines** for the goals.
3. The need to establish **responsibility** for meeting the goals in a timely fashion and for **contingency plans** for the state if the goals are not being met.
4. The need for clear, regular **communication** with the Flint community and stakeholder groups regarding action steps and updates.

We also believe it important that a single person or entity—potentially independent of any one particular state agency and mutually agreeable to this Task Force and you, Governor—be established to provide effective coordination of ongoing activities and reporting on the status of mitigation measures. For this, we also believe a readily understood “dashboard” should be developed that reports on the goals, timelines and assignments. This will enable members of the Flint community, public health providers, and state agencies to know about the status of the Flint water crisis mitigation program, as

well as promote coordination and accountability. The Task Force is prepared to assist in the development of that dashboard.

We believe it is vitally important that trusted members of the Flint community be engaged in communication on this issue, as well as the distribution of information conveyed by our suggested dashboard reporting. Accordingly, in advance of our final report, we would like to ensure the independent coordinator suggested above engage trusted community groups to begin rebuilding community trust in state actions.

We appreciate your personal interest in this issue, commitment to assisting the Task Force in our review, and—most importantly—commitment to ensuring that the full measure of state resources are brought forward to protect the public health in Flint and throughout the state.

Respectfully yours,

Flint Water Advisory Task Force:

Dr. Matt Davis

Chris Kolb

Dr. Larry Reynolds

Eric Rothstein

Ken Sikkema

December 29, 2015

Dear Governor Snyder:

The Flint Water Advisory Task Force, which you appointed on October 21, 2015, has devoted considerable effort and countless hours to our review of the contamination of the Flint water supply: what happened, why it occurred, and what is needed to prevent a recurrence in Flint or elsewhere in the state. We have also been assessing ongoing mitigation efforts to help assure that short- and long-term public health issues and water management concerns will be properly addressed to safeguard the health and well being of the Flint community.

Shortly after we began our work, we recognized the immediate need for better coordination of the state's response to the ongoing public health issues in Flint, and for assignment of a single person to provide this coordination. We addressed these concerns in a letter to you on December 7, 2015, and you responded with immediate adoption of these recommendations. We thank you for the commitment your response demonstrates.

In our continuing efforts, we have now interviewed numerous individuals at state and local levels; reviewed many documents, articles, and emails; and deliberated repeatedly as a group. Both individually and as a group, we have visited Flint several times during the past several weeks to meet with citizens, public health officials and healthcare providers, individuals who have water management responsibilities at the city and county levels, and other public officials.

It is clear to us, particularly as we listen to the people of Flint, that it is both critical and urgent to establish responsibility for what happened in their community and to ensure accountability. This is a first step in a long process to re-establish the trust they no longer have in their government and the agencies whose responsibility it is to protect their health. It is urgent because this deep distrust of government continues to compromise the effective delivery of protective services designed to address ongoing public health issues. It is for these reasons that we are sending this letter at this time.

**We believe the primary responsibility for what happened in Flint rests with the Michigan Department of Environmental Quality (MDEQ). Although many individuals and entities at state and local levels contributed to creating and prolonging the problem, MDEQ is the government agency that has responsibility to ensure safe drinking water in Michigan. It failed in that responsibility and must be held accountable for that failure.**

The Safe Drinking Water Act (SDWA) places responsibility for compliance with its requirements on the public water system. In this instance, the City of Flint had the responsibility to operate its water system within SDWA requirements, under the jurisdiction of the MDEQ. The role of the MDEQ is to **ensure** compliance with the SDWA through its regulatory oversight as the primary agency having enforcement responsibility for the Flint water system.

The MDEQ failed in three fundamental ways.

#### **Regulatory Failure**

We believe that in the Office of Drinking Water and Municipal Assistance (ODWMA) at MDEQ, a culture exists in which "technical compliance" is considered sufficient to ensure safe drinking water in Michigan.

This minimalist approach to regulatory and oversight responsibility is unacceptable and simply insufficient to the task of public protection. It led to MDEQ's failure to recognize a number of indications that switching the water source in Flint would—and did—compromise both water safety and water quality. The MDEQ made a number of decisions that were, and continue to be, justified on the basis that federal rules “allowed” those decisions to be made. ODWMA must adopt a posture that is driven not by this minimalist technical compliance approach, but rather by one that is founded on *what needs to be done to assure drinking water safety*.

A culture change must occur within ODWMA. It must be driven by a mission that is aspirational regarding the role of the MDEQ in ensuring the safety and the quality of Michigan's drinking water. We believe, and have expressed to MDEQ Director Dan Wyant, that as a Great Lakes State, Michigan should aspire to have the safest drinking water in the nation, rather than merely aiming for technical compliance with regulatory requirements.

#### **Failure in Substance and Tone of MDEQ Response to the Public**

Throughout 2015, as the public raised concerns and as independent studies and testing were conducted and brought to the attention of MDEQ, the agency's response was often one of aggressive dismissal, belittlement, and attempts to discredit these efforts and the individuals involved. We find both the tone and substance of many MDEQ public statements to be completely unacceptable. In a real way, the MDEQ represents the public, including the very individuals it treated dismissively and disrespectfully in public statements. We recognize that the agency might disagree with the opinions of others on a variety of issues, including testing protocol, interpretation of testing results, the requirements of federal law and rules, and other matters. What is disturbing about MDEQ's responses, however, is their persistent tone of scorn and derision. In fact, the MDEQ seems to have been more determined to discredit the work of others—who ultimately proved to be right—than to pursue its own oversight responsibility.

#### **Failure in MDEQ Interpretation of the Lead and Copper Rule**

The federal Lead and Copper Rule (LCR) is central to what happened in Flint, because that rule, at least theoretically, is designed to prevent lead and copper contamination of drinking water. The federal LCR calls for “optimized corrosion control treatment,” which the MDEQ did not require in the switch to the Flint River. Prior to the switch, MDEQ staff instructed City of Flint water treatment staff that corrosion control treatment (CCT) was not necessary until two six-month monitoring periods had been conducted. The need for CCT would be evaluated after the results from those two monitoring periods were reviewed. The decision not to require CCT, made at the direction of the MDEQ, led directly to the contamination of the Flint water system.

The MDEQ seems to have taken different positions on whether it faithfully followed the LCR in the Flint situation. It first maintained that it followed the LCR, then stated that it did not follow the rule properly, and most recently claimed that a federal memorandum issued by the US EPA in early November 2015 suggests that the original MDEQ interpretation was possibly correct.

We are not convinced. Even the MDEQ's latest interpretation of the US EPA's November memorandum is overly legalistic and misunderstands the intent of the LCR, which is to minimize risks of lead and copper exposure for human health.

We believe ODWMA's single-minded legalistic focus is the heart of the problem, and it is part of the “technical compliance” culture described above. ODWMA should not be basing its actions solely on a

legally possible interpretation of the LCR. It should be focusing on how to protect Michigan's citizens from lead in drinking water.

We met with MDEQ Director Wyant on December 16, 2015, to discuss these issues, as well as many others. We note his substantial agreement with many of our conclusions, particularly as it relates to the regulatory failure and the abysmal public response of his agency. It is our understanding that he has drawn similar conclusions in his own evaluation of the MDEQ's role in the Flint water crisis. At the same time, it was disappointing to hear his weak defense of the CCT decision based on the EPA's November 2015 memorandum.

We are not finished with our work. Other individuals and entities made poor decisions, contributing to and prolonging the contamination of the drinking water supply in Flint. As an example, we are particularly concerned by recent revelations of MDHHS's apparent early knowledge of, yet silence about, elevated blood lead levels detected among Flint's children. We also feel it important to further review local government decision processes under emergency management. Our final report will highlight and discuss those concerns, among many others, to provide some context to a comprehensive series of recommendations. **As stated earlier in this letter, however, we believe that establishing responsibility is a critical and urgent need, and one that should not wait for our final report in 2016. Individuals and agencies responsible must be held accountable in a timely fashion.**

It is our hope that the heightened awareness of the dangers of lead poisoning can be an opportunity to make Michigan safer, particularly for its children. Drinking water must be recognized as a potential source of health risk exposure when water lines and fixtures containing lead are disturbed or compromised. Proper testing, not only in high-risk areas but also in facilities serving children (e.g., schools), must be considered. Facilitating long-term financing of a model public health program, and also replacement of lead-containing water service lines and fixtures, would enable Michigan to realize a positive lasting legacy from the tragedy of the Flint water crisis. Our final report will address some of these issues.

The City of Flint's water customers—fellow Michigan citizens—were needlessly and tragically exposed to toxic levels of lead through their drinking water supply. They deserve a commitment to properly assess responsibility and ensure accountability. They also deserve a commitment to needed mitigation in both the short and long term. The Flint water crisis never should have happened. Having failed to prevent it, state government should coordinate a sustained, public-health-focused response to remedy, to the fullest extent possible, the impacts on the Flint community.

Respectfully yours,

Flint Water Advisory Task Force:

Matt Davis  
Chris Kolb  
Larry Reynolds  
Eric Rothstein  
Ken Sikkema

January 22, 2016

Governor Rick Snyder  
Office of Governor  
P.O. Box 30013  
Lansing, Michigan 48909

Dear Governor Snyder:

The Flint Water Advisory Task Force (FWATF) appreciates your recent efforts to secure federal and mobilize state emergency response resources to address the immediate water supply issues in Flint.

This letter is to encourage a similarly robust response to the challenges of re-establishing a reliable, trusted potable water distribution system in Flint. This is required as soon as possible to replace the unsustainable and expensive bottled water and filter distribution program that has been necessitated, but which clearly must serve as an interim, emergency response.

Consistent with the priorities identified in the Safe Drinking Water Emergency Order issued by the EPA on January 21, 2016, we recommend the following actions to address scientifically grounded concerns that the water system in Flint remains unsafe because of lead contamination and Legionella. Public trust in the safety of the water supply may only begin to be re-established through the state's forthright engagement of the scientific experts who overcame state and federal agency intransigence to expose the lead poisoning.

Our recommendations are:

- Engage US EPA staff experts versed in Lead and Copper Rule (LCR) requirements – specifically Miguel del Toral, Darren Lytle and Michael Shock. These individuals should be empowered to guide implementation of a comprehensive LCR sampling program in Flint that will monitor lead levels now and throughout the conversion to raw water supply by the Karegnondi Water Authority (KWA) and full-time use of the Flint Water Treatment Plant.
- Establish an inter-disciplinary work group comprising subject matter experts drawn from respected public utility associations and institutions of higher learning in Michigan and elsewhere (including Marc Edwards of Virginia Tech), to oversee the conversion to KWA-supplied raw water.
- Commission and/or contract with an unbiased third-party organization or consortium (hereafter: Flint water safety scientific assessment team [FWSSAT]) that will be responsible for assessing the quality and safety of drinking water in residences, schools and child care settings in Flint, and hospitals and other healthcare facilities served by the

Flint water system. The explicit focus of FWSSAT activities will be lead and Legionella; however, the FWSSAT may include other considerations in its work.

The FWSSAT will be invested with the responsibility of declaring when the public water supply in Flint is safe for routine consumption. The FWSSAT will employ the most rigorous scientific standards, using a sampling strategy that is designed to optimize detection of water contamination in home, school, and child-care settings, and healthcare environments. All schools and healthcare facilities must be included in the sampling approach. Rigorous sampling of residences and child-care settings (whether centers or in-home) will also be implemented, using any and all available information about lead water service lines. In addition, if a homeowner or renter whose dwelling has not been included in sampling wishes to have the dwelling included, they will also be sampled. The sampling efforts and reporting process of the FWSSAT will be fully transparent to the public; results of testing should be published on local, state, and federal (EPA) websites.

- To assure the re-building of community trust and assure sufficient expertise for future water quality and safety, the FWSSAT should partner with local (Flint Water Treatment) and state (MDEQ) personnel in its activities. The FWSSAT should have an interdisciplinary advisory committee that includes local community leaders, local and state officials, national scientific authorities regarding water quality and safety and public health, and the leader of the interagency state effort regarding the Flint water crisis. When the FWSSAT advisory committee is satisfied that the FWSSAT scientific procedures have thoroughly assessed water quality and safety in Flint residences, schools and child care settings, and healthcare facilities and found the water to be sufficiently free of contamination, then the committee will advise the public of the findings. The FWSSAT will then organize the transfer of responsibility to local and state authorities to sustain the sampling and reporting methods thereafter, including the conversion to KWA raw water in the future.

We also believe that a forthright response to the Legionella outbreak must similarly engage trusted, scientific experts drawn from independent institutions. Accordingly, we recommend:

- The Michigan Department of Health and Human Services (MHHS) should make a formal request to the federal Centers for Disease Control and Prevention (CDC) for assistance in assessing the outbreak of Legionnaire's disease in Flint, if they have not already done so. MHHS, working with CDC, should develop a strategy for improving prevention, rapid detection, and timely treatment of cases of Legionellosis in Michigan in 2016 and beyond. While the MDHHS evaluation of the dozens of cases of Legionellosis in 2014 and 2015 has strongly suggested a link to the shift to drinking water from the Flint River in 2014, further and more intensive evaluation of clinical isolates (i.e., samples from infected patients) is necessary to understand the route(s) of transmission from contaminated water to humans. The unique set of outbreak circumstances in the setting of a change in water source strongly indicates that support from federal public

health authorities would be a welcome way to amplify the public's collective understanding of risk of contracting Legionella in residences served by the Flint water system, and in Flint healthcare facilities.

- The state should specifically request federal support from the CDC – and, as appropriate, additional federal experts and agencies – to advise and assess Flint healthcare facilities and Flint-based healthcare providers regarding: (a) appropriate application and timely re-application of biocides to air treatment systems and cooling towers in all healthcare facilities in Flint, in order to prevent colonization with Legionella; and (b) proper assessment and timely diagnosis of Legionella among patients in Flint who present with characteristic signs and symptoms and have a history of potential exposure to contaminated water. Of note, the risk of resurgent Legionellosis in Spring 2016 is on the horizon; the first cases of Legionellosis in the 2014 and 2015 outbreaks were diagnosed in June and May, respectively, and Legionella is known to be much more common in the spring, summer, and fall than in the winter months. Time is of the essence.
- MDHHS should work with its federal partners to assure that investigative efforts related to Legionella regarding quality and safety of water are conducted in coordination with the FWSSAT described above. Furthermore, MDHHS should regularly communicate its findings to the Flint community regarding its efforts to prevent, detect, and treat cases of Legionella until case levels return to pre-2014 levels.

We expect that these measures will provide members of the Flint community with assurance that the quality of their tap water is being appropriately monitored and that forthcoming announcements that Flint's tap water is safe to drink are well-founded. Notwithstanding earnest state agency actions, we believe that the engagement of independent subject matter experts, whether to assess drinking water quality or public health concerns, is critical to overcome, over time, the understandable skepticisms that prevail in the Flint community.

We hope that you will receive these recommendations in the same spirit with which they are offered – to advance the recovery and reinvigoration of the Flint community.

Respectfully,

Matthew Davis, M.D.  
Chris Kolb  
Lawrence Reynolds, M.D.  
Eric Rothstein, CPA  
Ken Sikkema

## **APPENDIX III: Interviewee Listing**

## Flint Water Advisory Task Force

### Interviews and Discussions Listing

No.	Last Name	First Name	Organization
<b>Federal and State Office Holders / Key Officials</b>			
1	Kildee	Daniel T.	U.S. House of Representatives
2	Ananich	James	Michigan State Senate
<b>Michigan Governor's Office</b>			
3	Snyder	Rick	Michigan Governor's Office
4	Muchmore	Dennis	Michigan Governor's Office
5	Baird	Rich	Michigan Governor's Office
6	Hollins	Harvey	Michigan Governor's Office
<b>Michigan Department of Treasury</b>			
7	Dillon	Andy	Treasury Department
8	Workman	Wayne	Treasury Department
9	Saxton	Thomas	Treasury Department
10	Byrne	Randall	Treasury Department
11	Sampson	Jeremy	Treasury Department
<b>Flint Emergency Managers - Office Holders</b>			
12	Ambrose	Jerry	City of Flint
13	Earley	Darnell	City of Flint
14	Kurtz	Ed	City of Flint
15	Brown	Michael	City of Flint
16	Weaver	Karen	City of Flint
17	Walling	Dayne	City of Flint
18	Henderson	Natasha	City of Flint
19	Freeman	Josh	City of Flint
<b>City of Flint Staff and Consultants</b>			
20	Lundquist	Jody	City of Flint
21	Brown	Inez	City of Flint
22	Croft	Howard	City of Flint
23	Johnson	Daugherty	City of Flint
24	Wright	Brent	City of Flint
25	Glasgow	Mike	City of Flint
<b>Flint Community</b>			
26	Mays	Melissa	Flint Citizen
27	Overton	Allan	Flint Citizen
28	Shariff	Nayyirah	Flint Citizen
<b>Michigan Department of Environmental Quality</b>			
29	Wyant	Dan	MDEQ
30	Sygo	Jim	MDEQ
31	Creagh	Keith	MDEQ
32	Krisztian	George	MDEQ
33	Anderson	Madhu	MDEQ
34	Shekter Smith	Liane	MDEQ
35	Rosenthal	Adam	MDEQ

## Flint Water Advisory Task Force

### Interviews and Discussions Listing

No.	Last Name	First Name	Organization
36	Busch	Stephen	MDEQ
37	Prysby	Mike	MDEQ
<b>Michigan Department of Health and Human Services</b>			
38	Lyon	Nick	MDHHS
39	Becker	Tim	MDHHS
40	Wells	Eden	MDHHS
41	Larder	Cristin	MDHHS
42	Lasher	Geralyn	MDHHS
43	Moran	Susan	MDHHS
<b>US EPA</b>			
44	Hyde	Tinka	EPA
45	Crooks	Jennifer	EPA
46	Hedman	Susan	EPA
47	Kaplan	Bob	EPA
48	Del Toral	Miguel	EPA
49	Porter	Andrea	EPA
50	Blair	Rita	EPA
51	Poy	Tom	EPA
<b>Technical Experts - WQ and Lead</b>			
51	Betanzo	Elin	Northeast-Midwest Institute
52	Edwards	Marc	Virginia Tech
53	Sullivan	Laura	Kettering University
54	McElmurry	Shawn	Wayne State University
<b>Public Health Community</b>			
54	Hanna-Attisha	Mona	Hurley Medical Center
55	Valacak	Mark	Genesee County Health Dept.
56	Doerr	Kay	Genesee County Health Dept. - Board of Health
57	Henry	James	Genesee County Health Dept.
<b>Media</b>			
58	Guyette	Curt	ACLU
59	Fonger	Ron	MLive
<b>KWA - DWSD</b>			
59	Wright	Jeff	GCDC
60	O'Brien	John	GCDC
61	Jansen	Dave	GCDC
62	Wolfson	William	GLWA / DWSD
63	Koesters	Laurie	GLWA / DWSD

## **APPENDIX IV: Questions of Lockwood, Andrews, & Newnam**

Lockwood, Andrews and Newnam  
Flint Water Advisory Task Force Questions  
February 22, 2016

1. Please describe your firm's experience with drinking water treatment facilities, specifically related to drinking water quality, treatment of river water supply, disinfection and disinfection byproduct management, corrosion control, and startup for full-time operation.
2. Please describe your firm's experience with distribution system management, including corrosion control, disinfection and DBP management, and Legionella management.
3. Please provide the scope of work for your engagements related to preparing the Flint Water Treatment Plant for full-time operation, as well as any subsequent engagements.
4. Please describe the procurement processes used for contracting these scopes of service. Please provide copies of relevant proposals and contracts.
5. Please provide a narrative describing LAN's involvement with City of Flint and MDEQ staff throughout your engagement with the City related to full-time operation of the Flint Water Treatment Plant.
6. Please provide a list of your findings and recommendations to address the various water quality problems that occurred following startup of full-time operation of the Flint Water Treatment Plant.
7. Please provide your subjective assessment of the condition and technologies at the Flint Water Treatment Plant and distribution system prior to full-time operation of the plant.
8. Please identify all team members (including LAN staff and any subconsultants) who worked on the project to prepare the Flint Water Treatment Plant for full-time operation. Describe their respective roles on the project and their experience. If any other staff or consultants were engaged for guidance or review, please include those individuals as well.
9. Please describe the reporting structure (both LAN's project team reporting structure and its reporting relationship to City of Flint staff and Emergency Manager) for LAN's work on the Flint Water Treatment Plant, specifically for preparations for full-time operation of the plant.
10. Please provide a copy of any deliverables prepared to support full-time operation of the Flint Water Treatment Plant, including the plan of treatment that was reviewed with MDEQ.
11. Please review your discussions with the City of Flint utility staff and MDEQ regarding Flint River water chemistry and treatment requirements, specifically relating to:
  - a. Anticipated treatment challenges related to use of Flint River
  - b. Prospective disinfection requirements and options for management of DBPs
  - c. Corrosion control
12. Please describe the decision-making processes related to treatment requirements, specifically with regard to corrosion control treatment.

13. What was the nature of the discussions regarding Lead and Copper Rule compliance requirements?
14. Did LAN identify requirements for Lead and Copper Rule compliance in advance of discussions with MDEQ?
15. Did LAN express any concerns or cautions with respect to MDEQ's interpretation of Lead and Copper Rule requirements for water treatment?
16. What were the outcomes of discussions with MDEQ regarding treatment requirements, specifically regarding compliance with Lead and Copper Rule requirements?
17. Please outline your interactions with other consultants and suppliers working on the Flint Water Treatment Plant, both during preparation for and after startup of full-time operation, including Rowe Professional Consultants, Veolia and any others.
18. Please describe LAN's involvement with the City of Flint's Technical Advisory Committee. Please provide copies of any presentations or handouts offered in the context of the Technical Advisory Committee discussions.
19. Please offer any key points or information not already provided that you think would be of value in addressing the causes of the Flint water crisis and avoiding similar situations in the future. Please provide any recommendations to address prospective Flint water system needs.
20. Please offer any key points or information not already provided that you think would be of value in addressing the causes of the Flint water crisis and avoiding similar situations in the future. Please provide any recommendations to address prospective Flint water system needs.